The Province of Alberta

Natural Gas Utilities Board.

IN THE MATTER OF "THE NATURAL GAS UTILITIES ACT"

—and—

IN THE MATTER OF an Enquiry into Scheme to be adopted for Gathering, Processing and Transmission of Natural Gas in Turner Valley

G. M. BLACKSTOCK, Esq., K.C., *Chairman*

Dr. E. H. BOOMER, F.C.I.C., *Commissioner*

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DECISION

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Incidentally, it may be mentioned that as far as is known to the Board there is no similar legislation on this continent, neither is there any known formula by which just and reasonable prices can be determined.

It will be seen that at the moment the Board's price fixing powers are permissive only, while the proviso quoted above was, as the Board apprehends it, intended to make it abundantly clear that the Board has no jurisdiction over prices to be paid for absorption plant products. It seems to the Board that it cannot adequately discharge its functions without exercising its power to fix just and reasonable prices to be paid for natural gas at the well-head but without regard to the value of hydrocarbons which may be extracted therefrom.

The problem is a perplexing one and the voluminous evidence adduced which, although relevant and valuable, affords but little help in arriving at a satisfactory solution of it.

Section 70 provides that:-

"Every well ..... capable of producing natural gas shall be a public utility."

Implicit in that declaration is a direction to the Board to apply public utility principles in arriving at a well-head price. In Turner Valley there are two hundred and eighty wells, some producing crude oil, natural gas impregnated with natural gasoline, others producing naphtha, natural gas and natural gasoline, each well having a different quantum of production of these various commodities, each one drilled at different times and at different cost, some of which have paid out the original investment, plus profits, some which may in time pay

original investment and perhaps profits, and others which will never pay the original investment. The application of public utility principles is obviously impossible if any degree of uniformity is to result. That difficulty was realized and the Statute was amended so as to negative the application of public utility principles by giving the Board power to fix and determine different prices for or in respect of different sections or areas of a field, or to classify wells in a field in groups and to fix prices paid for natural gas produced from such classifications or groups and giving the Board power to adopt any just and reasonable basis or method of arriving at or computing such price or prices as might be deemed applicable or proper, having regard to all the circumstances and factors involved.

Evidence was given to demonstrate the impossibility of the public utility approach to the problem. Mr. H. Zinder, called as a witness by the Producers' Committee, accepted, for the purpose of illustration, certain figures prepared by Mr. Hamilton, contained in an exhibit filed by him. Those figures included a rate base for sixty Royalite gas cap wells determined by using original cost less accrued depreciation. Proper debits and credits were applied to operating results and a return of eight per cent per annum on the investment was assumed. The result arrived at a well-head price of 11.2 cents per thousand cubic feet. The figures submitted might possibly be criticized but a variation in them would make little material difference to the final result. No similar figures were submitted respecting crude oil wells and indeed it was indicated that in the case of crude oil wells it would be necessary to

make so many arbitrary assumptions, that the result would be of little value. On the other hand, a calculation was made in which a well-head price of five cents per thousand cubic feet was assumed which, when applied, worked back to a return of 2.11 per cent per annum on the rate base used in the calculation.

Mr.Zinder made further calculations, allocating costs on a B.T.U. basis for crude oil wells, first, on the basis of gas marketed and second, on the basis of gas produced, resulting in a price of 17.64 cents and 36.02 cents per thousand cubic feet, respectively. He considered from all of these results that the public utility approach must be dismissed.

Other methods would be to consider historic gas prices in Turner Valley and prices paid for gas in other fields on this continent. The historic well-head price in Turner Valley has been two cents per thousand cubic feet. Royalite has supplied gas to Canadian Western at the following prices:

From 1921 to 1925	13¢ per M.c.f.
From 1925 to 1928	10¢ per M.c.f.
From 1928 until present time	7 3/4¢ per M.c.f.

Unfortunately, the Board has no break down of these prices. It must assume that these prices included some price or value for the gas, the cost of gathering, scrubbing and delivering the same and the cost of required compression, if any, plus a profit on the whole transaction. The Board cannot assume that Royalite omitted any of these items on philanthropic or other grounds. There is, however, evidence that Royalite purchased from other producers natural gas which went to the market and for which the purchase price

was two cents per M.c.f. Whether Royalite added a profit to itself on this purchased two cent gas in its over-all price to Canadian Western can only be a matter of conjecture. There is no direct evidence to indicate whether or not the two cents price was arrived at on a bargaining basis between two parties in an equally advantageous bargaining position and at arms' length, or whether, since ample supplies of waste gas were available, Royalite dictated the price on a take it or leave it basis.

Evidence was submitted respecting prices paid for natural gas in the United States. Figures were submitted by Mr. Zinder from statistics published by the United States Bureau of Mines. In 1920, the over-all average value was 9.42 cents per M.c.f., rising to 11.1 cents in 1922. Thereafter there was a steady decline until 1940 when a low of 4.5 cents per M.c.f. was reached, rising in 1943 to 5.2 cents. In the same period, marketed production rose from 792,210 million cubic feet to 3,414,689 million cubic feet. No reasoned conclusion can be drawn from these figures. The high and the low figures in arriving at these averages might and probably would present tremendous variations and the low might very well be less than the Turner Valley historic price of two cents per M.c.f. Clearly, howeger, the increase in market demand was accompanied by a decrease in price, no doubt due to excess and increased production through the discovery of new gas fields. It must be noted that the figures quoted are expressed to be "value" and not price. It was stated that some of the gas referred to in these statistics might have been utilized by producers for their own purposes and not sold, hence the "value" instead of "price figures

Mr. Zinder also submitted figures from nine selected pipe line companies in different parts of the United States of America, for the years 1943 and 1944. The lowest field price in 1943 was 3.96 cents per M.c.f. paid by the United Gas Pipe Line Company, and the highest, 7.26 cents per M.c.f. paid by Mississippi River Fuel Company. A calculation discloses an average price of 5.13 cents per thousand cubic feet.

In 1944, the range was 3.99 cents to 7.12 cents with an average price of 5.06 cents per M.c.f. All of these figures represent averages and are subject to all the disabilities attaching to the use of averages.

The schedules containing these figures are headed "Field Price". Mr. Zinder, however, stated that these were essentially well-head prices. He stated that a substantial portion of the gas purchased by these selected companies is delivered at the well-head, some at the end of a gathering line and some at an absorption plant. The impact of transportation costs from the well-head to the end of a gathering line or to an absorption plant is not shown and it may be that the prices shown would be substantially less if these factors were known and had been taken into account.

The field price in West Virginia ranges from a high of 18.9 cents in 1931 to a low of 12.3 cents in 1943; in Kentucky, the high is 15.2 cents in 1930 and the low is 12.1 cents in 1935, with a price of 14.7 cents in 1943; in the Pennsylvania Fields the range is from 29.3 cents in 1928 to 23 cents in 1943. The source of these figures is the United States Bureau of Mines' Statistics and they must necessarily be related to the general averages before mentioned and illustrate the danger of using averages.

The three areas above mentioned are generally known as the Appalachian area and Mr.Zinder admitted that this area was the least comparable with production in the Turner Valley field, the dry gas coming from shallow wells with low production. The cost of this gas has eliminated its use for boiler fuel, for the generation of electricity or for large industrial use.

Gas used by one of the nine companies referred to is taken from the Hugoton Field, where the average price paid is 4.4 cents. The gas is a sweet gas and does not require to be scrubbed and the well spacing is one well to 640 acres, as opposed to Turner Valley noxious gas which must be purified, and 40-acre well spacing. In the Texas Panhandle field, the price of gas is from four to five cents per M.c.f. and no scrubbing is required.

In spite of these facts, Mr.Zinder was of the opinion that the consumer should bear the cost of scrubbing, assuming that five cents was a fair price in each of the Hugoton and Turner Valley fields. That is hardly a logical conclusion but Mr. Zinder did add that the price in the Hugoton field was approved - not fixed - by the Federal Power Commission and was based upon usual regulatory principles of production, a principle which cannot apply here. He also conceded that the price of gas in Turner Valley must be a "judgment" figure and that the law of supply and demand must be considered.

Mr. Zinder also compared gas bills in Calgary reduced to a B.T.U. basis with similar bills in certain United States cities. For 100 Therms per month a Calgary bill would be $3.00 and for 250 Therms would be $6.75. For nine selected cities in the United States for the same Therms, the bills would range from a low of $2.26 and $5.65

to a high of $4.14 to $10.14. The climatic factor may so affect these figures that neither a proper comparison nor a logical deduction can be made.

The difficulty in applying any of these figures to the immediate problem is that the cost of gas transportation from Turner Valley to the various communities served by the Canadian Western and the subsequent distribution costs incurred by that company, would necessarily require to be compared with transportation costs to and distribution costs in the cities mentioned. Mr. Zinder also agreed that some of the prices paid by the companies already referred to were fixed on a bargaining arms' length basis and therefore represented competitive prices.

It is quite clear that gas from crude oil wells and from central and southern gas cap wells in Turner Valley was wasted before the enactment of this Statute and had no value because there was no market for it. The Statute directs operators to gather in all natural gas which can economically be used or stored and to sell the same at the prices and in the quantities fixed by the Board to such wholesale or retail market as the Board may direct. Thus, gas,which formerly was wasted, was given access to market and so acquired some value.

Mr.Zinder's theory that in time the prices of gas in this Province will reach an equilibrium cannot be wholly acceptable, although it has some merit. Edmonton and Calgary are two hundred miles apart and each city is served with natural gas. In Calgary, the principal source of gas is Turner Valley, approximately thirty miles away. The gas, which must be scrubbed, is produced from deep costly wells and is produced in volumes greatly in excess

of market demand from what is essentially an oil field, with forty acre well-spacing. Coal fields are from ninety to one hundred miles distant.

Edmonton is served from a sweet gas field ninety miles away with large acre well-spacing and the gas is produced as required from comparatively shallow wells. No compression or repressuring is required. There are coal mines at the city boundaries. There is no evidence that any equilibrium of well-head prices as between the two centres has been reached up to the present time or that the conflicting factors evident in the two fields will ever produce such an equilibrium.

Mr. Zinder, however, very properly suggested on cross-examination that his average figures went no further than to indicate to the Board some usefulness for comparison purposes in determining the price of natural gas in the Turner Valley field. He indicated conditions and prices which exist in other comparable fields so that his evidence affords a useful comparative if not a completely probative value and furnishes some aid in arriving at a judgment figure. For instance, the witness could not tell if the Texas Panhandle price for sweet gas was largely a gathered or a well-head price. He agreed that Mississippi Corporation's sweet gas was one hundred percent gathered and that the Natural Gas Pipe Line Company of America price was on the basis of one hundred per cent gathered. He could not say whether Interstate Gas was sweet or not and could not tell whether it was gathered or otherwise. He agreed that compression and scrubbing costs are factors which enter into the final value of gas. This much does clearly emerge from his evidence, that an average 5¢ price

is paid in various United States fields for very substantial volumes of sweet gas - some delivered at well-head from wells where the spacing is 640 acres and some delivered at other distant points. No figures are available as to what these distances might be.

He also agreed that Calgary should expect a low price for gas since it was formerly a waste product "right at its door".

In discussing a test of reasonableness, Mr. Zinder considers that a proper approach might be to ascertain first the competitive price of gas at the burner tip in Calgary and then from that price to deduct the cost of bringing gas to the burner tip. The remainder, whatever it might be, would represent the well-head price but he knew of no scientific formula by which a well-head price could be fixed, and repeated that in the final analysis the price must necessarily be a judgment figure.

Before dealing with Mr. Zinder's evidence respecting the relationship between the price of natural gas and coal, it is desirable to consider the evidence given by Mr. Ralph E. Davis. Mr. Davis agreed that the public utility approach in attempting to fix well-head prices was impractical. He based part of that conclusion upon the waste of gas in early years of the field. His opinion was that with the field so greatly depleted, the remaining gas is less valuable than it would have been, because former volumes and pressures would have made the need for compression machinery unnecessary until possibly 1960. He considered that the value of gas must be affected by the number of wells drilled primarily in a search for oil and the added cost due to the multiplicity of gathering lines

required. He quoted prices paid by Tennessee Gas and Transmission Company:

Period	Price per M.c.f.	Pressure	Pressure base
First 5 years	5¢	750	16.7 lbs.
Second 5 years	6¢	500	16.7 lbs.
Third 5 years	7¢	500	16.7 lbs.

These are prices paid at the delivery point, namely, the company's main pipe line and for sweet gas.

The price paid by Canadian Western to Royalite is 7 3/4 cents per M.c.f. for gas delivered at pressures up to 300 pounds on a pressure base of 14 pounds for gas which must be scrubbed before delivery. Converting these figures, Mr. Davis says that the real comparison is 3 1/2 cents in the case of Tennessee Company against 7 3/4 cents in Turner Valley.

He pointed out that a large percentage of the gas purchased by pipe line companies in the United States is not purchased at the well-head and specifically in the case of Natural Gas Pipe Line Company the gas was gathered and transported as much as one hundred miles to the point of delivery.

He quoted other cases. Michigan-Wisconsin Pipe Line Company purchases from Phillips Petroleum. The latter purchases from four other companies. Michigan pays Phillips Petroleum 5 cents per M.c.f. for gathered delivered gas at a pressure of 200 pounds per square inch minimum and measured at a pressure base of 16.4 pounds. If compression is required, Phillips will perform that service and will remove natural gasoline content and water. To fulfill its contract, Phillips purchases part of the gas required from other companies at 4 cents per M.c.f. measured at 16.4

pounds. If the gas contains more than one grain of H_2S the price is reduced by one-half cent per M.c.f. Mr.Davis alleges that if converted to a 14 pounds pressure base related to a gas with a high H_2S content, the price is 2.9 cents per M.c.f. and in the case of gas at the well-head on a basis equivalent to a 14 pound base, 3.4 cents per M.c.f. with its gasoline content. If the gas were sour and stripped of its gasoline content, it would be worth less than 3 cents per M.c.f.

The United Gas Pipe Line Company, the biggest natural gas company in the world, paid an average rice of 3 3/4 cents per M.c.f. in 1945 for sweet gas. Some of that gas is purchased practically at the well-head, some after being gathered by the seller and some after the extraction of natural gasoline.

He knew of no way to establish just what price should be paid for Turner Valley gas and that the figure arrived at by the Board must be a judgment figure.

He considered that the price of 2 cents per M.c.f. paid by Royalite to those producers who were connected to the absorption plant was a reasonable price.

He also dealt with the schedule filed by Mr. Zinder showing field prices for natural gas paid by selected pipe line companies in the United States. He analyzed the figures in some detail and showed the different circumstances which applied to volume, to point of delivery and the quality of the gas. Some was purchased at wells, some at absorption plants, some at the end of gathering lines and some at great distances from the point of production.

Questions were directed to the witness - as the Board understands them - to ascertain if Royalite No. 1

absorption plant in Turner Valley was built so as to make the gas going to Calgary safer for use than if the natural gasoline was still contained in it, or if the plant was built for the purposes of the additional revenue which could be obtained from the natural gasoline. If natural gasoline is extracted, the calorific value of the residue gas is reduced and Mr.Davis' view was that an absorption plant would only be installed if a profit could be made by doing so. He was clearly of the opinion that Turner Valley gas could safely be used for domestic and commercial uses even if it were not stripped of its natural gasoline content. The question of oil production with reference to the gas required to lift oil to the surface was dealt with. He would not advocate a reduction in the production of oil during the summer months just so that the gas produced by the oil would equal the market demand, but he also agreed with the view that if a market could not be found for all the gas, the surplus should be restored to the formation and if that could not be done then he considered that oil production should be curtailed.

In bargaining between the vendors and purchasers of gas, he stated that the price to the consumer, the heat value of the gas and fuel oil were considerations which affected the vendor of gas, while securit of gas supply for a long period of time is the factor principally considered by the buyer, but since such factors vary from place to place, no scientific formula could be worked out. Mr.Davis' evidence respecting well-head prices in other fields may be summarized:-

(1) The prices quoted by Mr.Zinder are not well-head prices but field prices.

(2) The prices paid were for gas at the point of delivery which frequently was at a point other than the well-head.

(3) The prices paid were for sweet gas.

(4) The prices paid were for gas produced at top hole average pressures of 500 to 2000 pounds per square inch, with flowing pressures which rendered the cost of compression machinery unnecessary.

(5) The net well-head prices quoted would be reduced to 3 1/2 or 4 cents per M.c.f. for sweet gas.

At a later date in the hearing, Mr. Zinder gave evidence respecting the value of gas and the elasticity of demand therefor in the City of Calgary. His primary submission is that the value of natural gas at the burner tip places an upper limit on the well-head price. From the burner tip price there must be deducted the total cost of transmission, scrubbing, compression and distribution. The cost of distribution in the retail market is an unknown factor but even if all costs were known there are other factors which still would leave the problem a complex one. The prices charged to the various types of customer and the result arrived at might affect customers in varying degrees. If one factor is unknown in any computation, then, in the absence of a scientific formula, the final figure must be determined on a judgment basis. The witness proceeded on the premise that coal is the principal fuel in competition with gas and he dealt with the relationship existing between them. The efficiency of the two fuels must be considered but he stated that since there are so many factors affecting efficiencies, little authoritative information was available. He, however, adopted relative efficiencies as follows:-

Use	Coal	Gas
Domestic	55	70
Commercial and Industrial	65	75

Assuming these efficiencies and using the respective B.T.U. contents, he deduced that the relative value of gas and coal in domestic use is:

1. Drumheller coal at $8.30 per ton is equivalent to 53.6 cents per M.c.f. for gas.
2. Blairmore coal at $7.50 per ton is equivalent to 37.2 cents per M.c.f. for gas.

The present domestic price of gas in Calgary is 25 cents per M.c.f. plus a tax of 8 per cent, or a total of 27 cents per M.c.f.

In the case of commercial and small industrial users, the comparison is (using the Canadian Western's No. 5 schedule):

1. Drumheller coal at $6.00 per ton equals 35 cents per M.c.f for gas.
2. Blairmore coal at $7.50 per ton equals 33.7 cents per M.c.f. for gas.

No. 5 schedule calls for a fixed charge of $1.00 per month and 26 cents per M.c.f.

In industrial use the comparison is:-

1. Drumheller coal at $4.00 per ton is equivalent to 23.4 cents per M.c.f. for gas.
2. Blairmore coal at $7.50 per ton is equivalent to 33.7 cents per M.c.f. for gas.

Other comparisons could be made. He concludes that gas rates in the various commercial schedules are well below competitive levels and that the value of gas at the well-head is greater than his assumed 2 cents per M.c.f. No

evaluation was made of the convenience, availability and cleanliness of gas compared with coal or the variations in the price of coal if demand for smaller sizes should increase, or variations in the price of coal when wartime restrictions are released or abandoned, nor did he evaluate the cost of storing and handling coal, the cost of removing ashes or the summertime fire hazard arising from the storage of coal. He considered that gas had an added increment of value represented by these advantages and by the saving in costs.

In dealing with the elasticity of demand, he pointed out that in 1937 the average domestic consumption per customer was 204 M.c.f. when the rate was 33 cents. In 1941, average sales had decreased to 184 M.c.f. with a rate of 27 cents. From these figures, he deduces that a substantial increase in price would not materially affect the volume of gas sales but would in fact produce increased revenue.

In 1929, Canadian Western had 238 commercial customers using an average of 4,791.81 M.c.f. In 1940 customers numbered 3,213 with an average use of 738 M.c.f. By 1943 (a rate reduction having been made in the meantime) there were 3,343 industrial users and average consumption increased to 1156 M.c.f. He considered that it would require a substantial increase in price to affect the use of gas by industrial customers.

With respect to the industrial load, he considered it to be the most sensitive to the cost of competing fuels. Except for customers using from 600 to 800 M.c.f. the price of gas is below competitive levels so that an increase in price of gas to those customers could influence volume of sales. All of these figures do not lead to any reasoned

conclusion. The situation is influenced by many factors such as price, temperature and the conditions of business as affected by varying econoric factors.

His final conclusion is that the price of gas to domestic consumers could be raised to 33 cents (this figure being used principally because that was the rate formerly charged by Canadian Western) and that the industrial rate could be slightly increased, without materially affecting the volume of sales but he did not express any opinion as to the effect of an increase in the price of gas to industrial consumers. Since Drumheller coal is predominantly used in Calgary, the spread between coal and gas on a B.T.U. basis and using the assumed efficiencies and the pres nt retail price would be 28.6 cents and if the price be increased to 33 cents, the spread is 20.06 cents, and these spreads would reflect the value of all the other offsetting factors between coal and gas. In the case of industrial load, the ultimate spread would be 2 cents. It is difficult to understand why there should be such a marked difference in the value of the intangible unascertained factors, all of which should apply with almost equal force to the domestic and commercial load.

As has already been pointed out, many factors enter into the problem and since it is not possible to evaluate them and since some of them are not known, Mr. Zinder's final figures must necessarily be judgment figures of his own, and only have comparative value.

For instance, it might be mentioned that he made no allowance for the cost of the installations made in Turner Valley to create a market for gas produced in the oil zone and formerly flared or in the additional cost of

operation, and he agreed that his efficiency factors were not actual for Alberta coal and gas and might be subject to marked variations resulting in similar variations in the final result.

Mr. F. A. Brownie also discussed this problem, comparing Drumheller coal for commercial and industrial use with 9080 B.T.U. per pound and 65 per cent efficiency with gas at 1000 B.T.U. per M.c.f. and 75 per cent efficiency and from these premises he deduced that coal selling at $4.34 would be equivalent in cost to gas at present rates. If rates went up progressively by two cents per M.c.f. to a maximum of 33 cents, coal could sell at progressively upward rates to $5.70 per ton. Drumheller stoker coal is available at $2.15 per ton plus $1.30 per ton freight. The delivery charge is not stated but if the total cost is $4.00 per ton, then the coal of this type is competitive in straight price with natural gas. He agreed that with a saturation of 90 per cent, the use of this coal would involve the installation of stokers, the conversion of furnaces or the installation of new furnaces. He does not contradict Mr. Zinder's price of $8.30 per ton for coal used in domestic furnaces.

Drumheller slack can be laid down in Calgary for $2.30 per ton. If present large users of natural gas (who have fuel oil stand-by equipment) could and would use Drumheller slack coal, it would be competitive with gas on a present price comparison. The cost of burning appliances, of labour costs and the like are not given. One would assume that establishments with fuel oil equipment would turn to oil if the use of gas became uneconomical and the picture therefore is not complete without a comparison of

fuel oil prices. The only one instance quoted was the use of fuel oil at Imperial Oil Refinery where it is stated that fuel oil would be competitive with gas.

Mr. Brownie dealt with electric power rates in various centres in the United States and in Winnipeg. The averages rates vary from .81 cents per K.W.H. in Winnipeg to 5.11 cents in Rhode Island. From the tabulations given he deduced that the higher the rate the smaller is consumption. It is noted, however, that in Arizona where the average rate is 3.65 cents per K.W.H. the average consumption is 1 331 K.W.H. against an average of 919 in Kentucky where 6he same rate prevails, whereas in Mississippi, the average consumption is 1,047 K.W.H. with a rate of 3.18 cents as against a consumption in Vermont of 1,051 K.W.H. with a rate of 4.18 cents per K.W.H. No doubt many other factors enter into these varying rates and consumptions and while on the average a certain trend may be indicated, no satisfactory general principle can be established which would be applicable to the problem at hand.

In 1922, the average domestic gas rate in Calgary was 44.4 cents per M.c.f. and in 1925 it was 46.11 cents, and in that period of relatively high rates gas was displacing coal as fuel in the Calgary market. That situation continued with some variations until the present degree of saturation was reached, although with declining rates. Mr. Brownie could not say under those conditions at which point coal in fact becomes competitive with gas.

Stanley J.Davies gave evidence respecting the relative values of coal and gas and he dealt at some length with efficiencies of these fuels and explained the factor which entered into a calculation of them. The maximum

efficiency which can be reached with gas burning equipment is 85 per cent. The most efficient plant in Calgary reaches 80 per cent. He considered that efficiencies in commercial plants will vary from 50 to 75 per cent and that few domestic consumers reached 70 per cent in efficiency and probably would go as low as 50 to 55 per cent.

In the case of coal, efficiencies in industrial plants vary from 76 to 81 per cent. He quoted examples of the Calgary School Board and the Burns' Company Packing Plant but the quantities used and the nature of the burning equipment are extreme in both cases and these two customers represent only an infinitesimal fraction of one per cent of all the Canadian Western customers. At the same time, in the School Board case, it was shown that the average cost per year for two schools, one using gas, was $710.29, and one using coal, stoker-fired, $898.92, or a difference in favour of gas of $188.63. He did not work out average efficiencies used by Mr. Zinder and Mr. Brownie. The use of averages may not lead to a completely accurate conclusion but it is equally difficult to apply maximum figures obtained by special uses and minimum figures estimated on a "may go as low as" basis.

His comparison of various coals with gas is:-

1. Drumheller stoker coal at a price of $4.00 per ton for large commercial and small industrial load is equal to 20.2 cents per M.c.f. for gas, whereas the present cost of gas is 26 cents per M.c.f.

The efficiency factor used is 75 per cent in both cases. In this figure, Mr. Davies is using the highest rate of 26 cents while under the particular schedule used the rate goes down to 17 cents, depending on the volume

used. Again in 1934, when the average rate was 33.73 cents and the price of coal less than it is today, commercial load was in fact not lost. He, however, ascribes that fact to new and more efficient burning appliances being used.

2. Drumheller slack coal at $2.30 per ton for large industrial users is equivalent to 11.7 cents per M.c.f. for gas with a present cost of 12.5 cents per M.c.f. The efficiency factor used is 76 per cent in both cases.

3. Drumheller slack for commercial use at $2.30 per ton is equivalent to 13.5 cents per M.c.f. for gas. The extent or the nature of use of slack coal is not given nor the relative market price for gas for such use. The efficiency factor used is 75 per cent for gas and 65 per cent for slack coal.

4. Canmore stoker coal at $6.22 per ton for commercial carload lots is equal to 22 cents per M.c.f. for gas, the same efficiency factors being used. The relationship is 25.7 cents per M.c.f. if the coal efficiency is 65 per cent instead of 75 per cent.

5. Canmore slack at $6.22 per ton for use in small industrial plants with pulverized coal installations and with a gas efficiency of 75 per cent and a coal efficiency of 80 per cent is equal to 20.8 cents per M.c.f for gas.

Mr. Davies also compares Crows Nest Pass coal with gas and in all cases the gas equivalent is higher than in the case of Drumheller coal and, except in the case of stoker coal, is less than the market price of 26 cents per M.c.f. These figures given and comparisons made,

with one exception, relate to large commercial and to small industrial users. They indicate that gas is more costly than coal (but only if the assumed efficiencies are accurate) and that the two fuels are now in competition with each other in the case of commercial and industrial loads. Obviously, factors other than price must have their effect on use and no doubt these factors are the intangibles and cost before discussed.

Lethbridge and Taber are on the Gas Company's mains and the spread between gas and coal is much greater than in the case of Calgary, with the result that very little gas is used for commercial purposes in Lethbridge and none for industry. The domestic picture is somewhat different.

Mr. Davies' figures indicate that neither lump nor egg coal is in competition with gas on a straight price consumption but that nut coal is. Again we have the variable efficiency factor to consider, the type of equipment used and all the intangible factors for which there is no known method of computation.

Although Drumheller coal is predominantly used in the Calgary market, Mr. Davies did not give any evidence respecting the relative value of that coal and natural gas, but simple arithmetic establishes that coal is not competitive with gas in the domestic field. In the Board's opinion, the only thing conclusively proved by all the figures submitted by these three witnesses is that whatever result is most desired can be attained by the simple expedient of varying the average efficiency factors and disregarding the variations in gas schedule prices due to variability of use, and applying these factors to the

various prices and grades of coal. The result must be always more or less arbitrary and cannot reflect all the relevant factors. The Board regrets that the evidence presented on this important question does not afford the Board with material aid in arriving at any reasonably scientific solution of the whole problem, and in making this comment no criticism is intended - counsel submitted the best evidence available.

Mr. Hamilton, the Board's Auditor, felt that the cost approach could not be entirely abandoned but could only be used as an upper limit on the price, that is if it were possible to ascertain the cost of a gas well operation. He, however, limits "cost" between actual cost and what the cost might have been and he agreed that other approaches to the problem could lead to a more equitable result. Other suggested approaches were:

1. By reference to the terminal price on the Canadian Western's system and working back to the well-head. The use of this method would involve an investigation into the affairs of Canadian Western.
2. That the producer should get some margin over costs which might be said should fall upon him such as repressuring costs.
3. To ascribe a nominal value to the gas since it is a waste product; and
4. To adhere to historic cost.

In argument, it was suggested that the Board should have regard to a well-head price which would be adequate to care for a reasonable part of the cost of production. How that approach is possible in Turner Valley is beyond comprehension, for we are dealing with what was

once a waste product and which now has a value only because a market has been created for it by the Legislature. We are dealing with a product which is a mere incident to the production of naphtha and oil and which it might be said has no production cost, but now has a share in the market served by Canadian Western. We are dealing with gas produced from scores of wells drilled at different costs in a search for oil and which have produced oil in greater or lesser degree. The evidence is quite conclusive that the cost approach is untenable. There are circumstances under which it might be possible to relate well-head price to cost of production but that could only be in a gas field not complicated by the production of oil and naphtha, where well spacing is adapted solely to gas production and such like matters. Such an approach, however, does not appear to be possible here.

Further argument was that persons and companies who drill wells in Turner Valley in a search for oil should be given a price for waste gas in an amount which will encourage them to search for new gas fields. It is difficult to imagine any oil operator being encouraged to engage in a search for gas fields. Their interest is in oil and if gas is found as an incident to oil production, then if a market can be found for gas then they are fortunate and a price for the gas can be fixed either by agreement or by the Board.

It was argued that Mr. Zinder's comparative United States figures were well-head prices but a reference to the caption on his schedules shows them to be field prices which could be and in fact were shown to be in many instances altogether different from well-head prices.

It was argued that if the price to domestic and commercial users had been increased in 1945 by 5 cents per M.c.f., Canadian Western's revenue would have increased by the sum of $487,403.00; that if the Nitrogen Plant had been billed on the same basis as other large users, additional revenues to Canadian Western would have been $150,000.00; that the latter earned $340,958.00 in excess of its permitted rate of return of 8 1/2 per cent per annum; that its gas purchased from Madison amounted to $1,014,893.00. Based on these arguments and assumptions, related to the 16,148,235 M.c.f. purchased in 1945, it was stated that Canadian Western could have paid 12.347 cents per M.c.f. instead of 7 3/4 cents per M.c.f. It was further argued that if this rate had been paid and that if Madison's costs were as outlined in the argument, the following prices could have been paid to producers:

1945

Producers connected to Madison	6.2998¢ per M.c.f.
Producers connected to British American	10.2157¢ per M.c.f.
Producers connected to Gas and Oil Refineries	2.0276¢ per M.c.f.

1945-1946 Inclusive

Producers connected to Madison	6.0531¢ per M.c.f.
Producers connected to British American	10.2226¢ per M.c.f.
Producers connected to Gas and Oil Refineries	1.5197¢ per M.c.f.

The 5 cents mentioned above is purely an arbitrary figure and the whole argument comes to this, that certain results would follow if certain things were assumed.

It was argued by Canadian Western and the City that the existing wholesale price of 7 3/4 cents is the

upper limit price. If that be accepted as correct, then if the cost of gathering, scrubbing, transmission and compressing should exceed that amount, the deficiency must be made up by the producers, which of course leads to obvious difficulty. Alternatively, it was suggested that if the historic well-head price be adopted, the extra costs involved by reason of increased installations must be deducted from that figure. It must be observed, however, that when the Legislature gave the Board power to fix just and reasonable well-head prices it did not also provide that the price of gas to the Candian Western was not to be disturbed.

It was also argued that the production of gas in Turner Valley was an incident to the production of oil and naphtha and that it had fulfilled its primary function when it raised these products to the surface, and thereafter was a waste product, and, as a result, gas consumers should not be called upon to pay a greater price for a waste product than for a primary product.

On the volume of evidence submitted, on the many assumptions on which so much of the evidence was based, on the voluminous calculations submitted and on the varied and violently opposed arguments, the Board has a statutory duty to fix a just and reasonable price for natural gas at the well-head without taking into account absorption plant products.

Four classes are affected - producers, the various companies gathering and processing gas, the retail distributing company, and finally the consumers on the Canadian Western and other distribution systems. These consumers are divided into domestic, commercial and industrial classes

each affected in different degree by relative price schedules. The Board considers it to be under a duty to fix rates that are fair to producers, to the wholesale and retail distributing companies and that are reasonable to all classes of consumer, and that it must not fix rates so that the impact of a particular rate on one class of consumer will call for a subsidy from another.

It has been laid down that a just and reasonable rate can never exceed and may in fact be less than the value of the service to the consumers, and that, on the other hand, justice to the public utility companies re-requires that the rate must allow a fair return on the respective rate bases after all operating costs have been met.

The rates fixed must, therefore, lie between these two limits. In Canadian Southern Railway vs. International Bridge Company, 8 A.C. 723, Lord Selborne said:

> "The principle must be, when reasonableness comes in question, not what profit it may be reasonable for the company to make but what it is reasonable to charge the person who is to be charged."

With that observation there must be coupled the thought that a utility company is entitled to and must be allowed a fair rate of return on capital invested. The value of plant and equipment for rate making purposes may be determined on one basis or another in terms of money, operating expenses can be determined accurately, subject, of course, to efficiency of operation, and a rate of return can be fixed. It is these elements that cause the cost of service to the customer to be less than would be the case if there were no regulation. The public is protected from charges which an unregulated monopoly might impose and at

the same time recognition is given to the principle that the utility company is entitled to a fair reward for the service which it renders. It seems to the Board that these principles apply to producers and to the price to which they are entitled for their product with as much force as they apply to the service companies and at the same time the impact of the well-head price must be related to the reasonableness of the rates which the consumer will be called upon to pay by reason of that price.

It is possible in this case that the cost of installations made by the field service utility companies may cause an increase in the cost of gas to the consumer. Any such increase is justified on the principle that rates must not be fixed at such a level as to deny a fair reward for the service rendered and that principle applies with added force since the installations were made pursuant to orders of the Board under statutory direction. It must also be considered that such installations were made for the dual purpose of conserving natural gas, by which the consumers benefit through an extension of the life of the field, and for securing to producers a market formerly denied to them. Unfortunately the price to be paid for natural gas at the well-head cannot be fixed in terms of money by the application of the same principles which apply to installations of machinery and the like. It is abundantly clear from the evidence that no economic theory, no arithmetic calculation, no scientific formula and certainly no legal formula can be found or established whereby a well-head price can be fixed which would completely answer the test of justice and reasonableness. In Public Service Gas Company vs. Board of Public Utility Commissioners, 84 N.J.L. 463, it is said:

"Like so many other questions in the law that involve the reasonableness of conduct, it is a question of fact to be settled by the good sense of the tribunal it may come before."

In the same case it is also said:

"The real test of the justice and reasonableness of an individual rate seems to be that it should be as low as possible and yet sufficient to induce the investment of capital in the business and its continuance therein....."

In O'Brien vs. Board of Public Utility Commissioners, 132 P.U.R. 1919 B 865:

"The question of the reasonableness of the rate has always been regarded as complex and as largely a business question."

The Board further considers that just as a reasonable rate means the reasonableness of rate schedules as a whole as opposed to the specific rates which compose the complete schedule, it must give what weight it can on such evidence as is before it to the whole rate structure from the well-head to the consumer's burner.

Normally, the cost of production plus a profit determines the price of a commodity and the profit will vary according to the conditions under which that commodity is produced and sold - supply and demand - and will depend upon whether it be exposed to the test of free competition or whether there be monopoly or whether there be regulation.

It would seem to the Board that regulation is designed to restrict the cost of a commodity to the cost of production properly ascertained, plus a reasonable profit. If then the cost of producing gas in Turner Valley

were known either actually or approximately, the problem would be much less perplexing than it is. There certainly is no such formula in the case of wells drilled in the gas cap, although, subject to what is to be said later, approximate costs of production may be ascertained. The ascertainment of even the approximate cost of producing gas in the oil zone is quite impossible. There is perhaps some force in the contention advanced on behalf of the City that there is in fact no such thing as the cost of production in either of the two zones. All costs of drilling were incurred in a search for oil and it can hardly be said that part of these costs so incurred - now that a market has been found for the waste gas - should be apportioned to gas. The value of the gas can only be its value at the burner tip less the costs incurred in transporting it from the well-head to that point. The waste product, itself, however, must have some value since it is now utilized as fuel and since, except for peak load periods, the gas in Royalite gas cap is being conserved for future use. How is the commodity value to be established when no evidence is available to establish production costs or where it is argued that there are no production costs? Without attributing to itself the possession of any superabundance of "good sense", the Board considers that it must apply to the problem the amount of good sense which it hopes it possesses and must arrive at its result by considering and applying all of the many factors which have been presented to it during the course of the hearing.

Counsel for Madison says that the Board must not consider the historic price of gas, must not use either an arbitrary or a judgment figure. The Board agrees that it

must not use an arbitrary figure and does not propose to do so but it has already in this decision quoted authority for its right to fix the price by a judgment figure.

So far as historic price is concerned it was said in The Public Service Gas Company case, supra:

> "In determining the justice and reasonableness or rates perhaps no better test can ordinarily be found than the rates charged in locations similarly situated although we do not say that even that test is infallible."

That dictum may not be completely applicable here and perhaps in pure rate making is much too sweeping but it at least affords some authority by which this Board has the right in its deliberations to consider the historic price of gas in this and other fields.

Turner Valley historic price, in view of the ample waste supply available, may have been a take-it-or-leave-it figure but in all probability it was a price less than the value placed by Royalite on its own gas. It does, however, afford a starting point.

Without going into the details of the Canadian Western's present rate schedules filed in this hearing, the domestic price of gas in Calgary is 25 cents per M.c.f. and that gas was purchased by Canadian Western from Royalite at 7 3/4 cents per M.c.f., a price arrived at on a bargaining basis. It does not necessarily follow that an increase in the wholesale price of gas will automatically increase the price to the consumer. It cannot be overlooked that between 1928 and 1939, the domestic rate was 33 cents but it does not follow that the value of the service today can be placed at 33 cents and that the Board is

entitled to regard 25 cents and 33 cents as the lower and upper limits of the price to the consumer. The service today is worth 25 cents per M.c.f. to domestic users and an increase in that price, if any, can only be justified by the cost of additional installations and by the statutory direction to the Board to fix a just and reasonable well-head price to the producer. The Board, however, is keeping before it present as well as past prices as factors to be considered in its final determination.

Well-head prices elsewhere must be considered, although in order to get an accurate concept of these prices, their effect upon the final burner-tip price, related to all other intervening costs, would have been of some assistance. However, competitive prices in comparable United States fields approximate from 5 to 6 cents per M.c.f. which are prices for sweet gas and which are subject to some reduction if scrubbing is needed. From the evidence given both by Mr. Zinder and by Mr. Davies, it is obvious that the cost of gathering and the cost of transportation to the point of delivery, if any, fall upon producers and these costs must reduce the net well-head price by some amount. In Turner Valley not only is gathering, transportation and scrubbing required but re-pressuring and compression must be resorted to, one for conservation and the other as an aid to transportation. A partially finished article cannot command the same price as a completed one and he who produces the former can only expect to receive a smaller price. The evidence also indicates that the transportation of gas in Turner Valley must be more costly than it would be if Turner Valley were purely a gas field, where if such were the case, the number

of wells and the number of gathering lines would be very much less than they now are. If in this case the producer asks for the same price for sour gas at the well-head as is paid in the United States for gathered sweet gas at the point of delivery where immediate compression is not required, he is asking that the public be called upon to pay the United States price plus the addition of all the services between the well-head and the point of delivery. There can be nothing just or reasonable in such a submission. The intervening costs between the well-head and the final point of delivery, and the cost of re-pressuring must be considered in relation to the well-head price.

There are still other matters to be considered. Producers in the oil zone now have a market formerly denied but now available to them. As mentioned before, when the Legislature enacted the Statute it did not direct the Board to see to it that prices in Calgary should not be disturbed, nor did it say to the Board, you will afford a market for waste gas and you must fix a price which will call upon the public to pay a price greatly in excess of what they once paid. These are matters which lie within the wide discretionary powers given; they are not questions of law but are purely business questions.

Neither can it be overlooked that producers in the oil zone not formerly connected to absorption plants are now and for many years will be in receipt of revenue from absorption gasoline, so that they are now in a favoured position compared with that formerly enjoyed by them.

The evidence indicates that in the domestic market, coal is not competitive with gas but that does not justify

the Board in placing the price of gas at a figure which will merely enable it to retain the market. The preponderance of evidence indicates that in the commercial market coal probably is competitive with gas but that again depends to some extent, as has already been pointed out, upon the percentage of efficiency used in arriving at the relativity of the two fuels and upon the willingness of commercial users to convert present gas equipment to new varieties of coal burning equipment and to mechanized stokers plus all the intangible costs already enumerated. Actual experience alone can afford the answer but it must be pointed out that if an increase in price results in a loss or partial loss of commercial or industrial load, the domestic consumer must suffer an increase in price. The loss of commercial or industrial load must result in deferred revenue to the producer and loss to the consumer.

The Board is not directed to fix a well-head price which will result in the public paying for gas an amount equivalent to the competitive price of coal, with some arbitrary allowance for intangible factors, nor is it directed to fix a price to the commercial consumer which will induce him to continue the use of gas instead of converting to coal. The price fixed must necessarily be a judgment figure related to the cost of the service now given and the additional costs which have been incurred for the dual purpose of making a waste product available to the market, and conserving gas for the future, and these must all be weighed against the various factors just discussed, and if possible some equilibrium maintained between past and future demand. Had Canadian Western been in a position to bargain with individual producers, the law of

supply and demand would have been the yardstick by which field prices would be measured. When the supply in Turner Valley exceeded the demand by very substantial amounts coupled with the existence of other gas resources already discussed, the company could and no doubt would have dictated the price which they would pay for gas. The abolition of the exclusive feature in the Royalite - Canadian Western contract standing alone would have put the latter in a favourable bargaining position with producers in all provincial fields, but that abolition was also coupled with provisions which limit to some extent the application of the law of supply and demand by the introduction of the just and reasonable price principle. The Statute, however, did not reverse the position of Canadian Western and the producers so as to place the latter in such a position as would enable them to dictate the price at which they would sell their gas.

Having given consideration to the regulatory principles previously discussed and having applied these principles to the entire record on this phase, and having considered the volume of production, the need for compression, scrubbing, repressuring and the nature and extent of the field, well-spacing and the like, the Board is of the opinion and so directs that Three (3) cents per M.c.f. is a just and reasonable basic well-head price to be paid to the producers for gas going to the residue markets, discounted in the case of all repressured gas on the basis previously discussed. That basic price must be subject to the principles which the Board has decided must be applied to cost allocation in the cases of B. A. Utilities and G.O.R. as discussed under that caption. The impact of the price or prices so fixed upon the rate schedules of

Canadian Western can only be determined by the Board of Public Utility Commissioners.

COST ALLOCATION

Madison Natural Gas Company Limited

In dealing with this subject some extended reference must be made to the history of the field and to the various absorption plants now situate in it.

In 1921, Royalite purchased three wells which were producing wet gas and some crude oil. That is the evidence but the Board assumed that "crude oil" in reality means naphtha. An absorption plant which had been operated in conjunction with these wells burned down in 1920. Royalite built a new absorption plant in 1921 and put in compression machinery to enable residue gas to be delivered to Canadian Western. Royalite No. 4 well, deepened to the Madison limestone, came into production in 1924 and the compressor capacity was increased. Gas was first delivered to Canadian Western from Royalite No. 4 in December 1925. It is, of course, possible - although there is no direct evidence on the point - that Royalite had in mind the residue market which was then in critically short supply. Royalite No. 4 established and was the first well in the gas cap. The gas contained a dangerously high percentage of sulphuretted hydrogen and a plant was erected to eliminate this toxic element. The 1921 absorption plant was closed down in 1926 or 1927 and except for the extraction of naphtha from the gas and the purification of it there was no other processing.

Royalite erected its present absorption plant

in 1933 by which time the Canadian Western market peak load was 60,000,000 cubic feet. At this time gas in excess of market demand was being delivered to the scrubbing plant, the explanation given being that hydrate formations in the gathering lines required excess delivery in order that continuity of supply to the market should be assured. Exhibits filed show that between 1933 and 1938 the gas marketed amounted to 54,167,000,000 cubic feet and during the same period over 257 billion cubic feet went through the absorption plant. In any case, the excess gas amounting approximately to 204 billion cubic feet was burned or wasted, or at least served no useful function. It was argued that the gas gathering system was designed to meet the needs of the scrubbing plant or, in other words, the residue market. The Board, however, must observe that the wells connected to the scrubbing plant were not drilled primarily to supply the market but were drilled for oil and as a result - at least up to 1939 in the case of Royalite - billions of feet of gas were burned in open flares, both before and after the erection of the scrubbing plant.

In 1933 - 1934, there was a very extensive enlargement of the gas gathering system - just after the absorption plant was built. The extensions connected to the absorption plant wells in which Royalite had no interest and except to a very small extent most of the residue gas from these wells was flared.

In 1935, Royalite constructed its No. 2 absorption plant some miles south from the No. 1 plant. It definitely did not deliver any residue gas to market. The gas gathering lines connected to the No.2 plant were designed for the recovery of natural gasoline and for no other purpose.

It was admitted in evidence that no single well was drilled for the recovery of natural gas.alone. It was also admitted that had the field been developed as a gas field, the drilling, the well-spacing and all the mechanics of its operation would have been different from that which exists today. This problem as it related to British American and Gas and Oil Products will be discussed later.

Royalite transferred to Madison its gas gathering lines and the Board agrees that no objection can be taken to this procedure since Madison must control and manage them. The gas gathered must be compressed to the working pressure of the absorption plant which pressure in turn is related to the pressure at which the residue gas must be delivered into the Canadian Western system. The costs of gathering and compression must therefore be divided between the absorption plant and the residue market.

In its original plan submitted to the Board, Madison proposed that Royalite should pay to it, 25 per cent of the gross value of natural gasoline extracted from the wet gas. Under existing contracts (assigned to Madison by Royalite) Madison pays to producers 20 per cent of the gross value of natural gasoline extracted and the balance of 5 per cent would represent Royalite's contribution to the gathering and compression costs. Madison would, therefore, bear the direct costs of operating the lines and the compressor stations, the amortization of all the equipment used and in return would receive the above percentage from Royalite. No figures were submitted to establish the relativity of the costs to the remuneration offered. It was suggested during the hearing that this proposal was a tentative one only but the plan as submitted to the Board does not bear out this contention. The exact words are

"settlement for the natural gasoline content should be based on the following", - then follows the method of settlement outlined above. The proposal thus made may have been tentative in the sense that it would be subject to examination, analysis and final determination by the Board, but there is nothing in the submission to indicate that it was tentative in the minds of Royalite or Madison officials.

At the opening of the hearing, Royalite submitted that the costs to be apportioned should be, direct operating expenses, general taxes, administrative and general overhead, depreciation, return on investment and income tax. The witness submitted that these costs should be borne by Madison and Royalite in proportion to their respective revenues. The witness stated that this (sales realization method) was one of the generally accepted methods of allocation and that apparently there was no more equitable method. No figures were submitted to demonstrate what the result would be.

Subsequently, Madison and Royalite both submitted that gathering and compression costs should be allocated on a volumetric basis. If that be the correct method then it becomes necessary to determine the respective volumes of material extracted or used in the absorption plant and the resultant residue gas.

The evidence is conflicting. Madison is computing marketable reserves in the field assumed a shrinkage of 15 per cent in the absorption plant. If that be so and if the volumetric method of cost allocation be adopted, then Royalite would be called upon to pay 15 per cent of the total costs and the residue market 85 per cent thereof.

In a subsequent submission relating to market sharing position, figures submitted by Madison indicated that the shrinkage in the absorption plant plus gas returned from the plant to the field for drilling fuel approximated 15 per cent of the amount delivered to the plant.

In its direct submission on this point, Madison estimated that the total wet gas gathering and compression costs for the years 1944 - 1948 would amount to $2,354,240 and that $228,068.00 should be charged to the absorption plant, the percentage being 9.688 per cent. This percentage is directly related to the estimated shrinkage and fuel consumed in the extraction process. It was admitted, however, that this percentage did not take into account unscrubbed residue gas returned to producers for drilling fuel.

On the other hand, a witness for Madison on cross-examination, admitted that for the purpose of internal accounting Royalite (prior to the incorporation of Madison) allocated these costs on the basis of 40 per cent to the absorption plant and 60 per cent to the residue gas. It can hardly be supposed that these are arbitrary figures but that they were used at least on some relative basis for the purpose of determining the result of the operations of the various departments of an integrated operation. There is no difference today in this integrated operation from that which existed before the enactment of the Statute. Theoretically Madison is performing a service for Royalite but in reality two integrated companies are carrying out two operations formerly carried on by one of them. The profits of the natural gas division of Royalite

belonged to Royalite and now the profits made by Madison out of its gas operations pass to Royalite, its principal shareholder. Again a breakdown of the 7 3/4 cents charged by Royalite to Canadian Western might have been of some assistance. The Board, however, cannot consider that the mere formation of a subsidiary company should result in the absorption plant being placed in a better position than formerly, especially when that position will be at the expense of the residue market.

The submissions made to the Board in the early stages of the hearing cannot be treated as being either tentative or frivolous. They were seriously made and the Board must assume that on analysis they proved to be less favourable to Royalite than the volumetric theory finally advanced. There is no criticism implied in this statement, for every company - integrated with others or not - is entitled to seek and to gain if it can all possible advantages.

Volumetric cost allocation in this case seems to proceed further on the theory that Madison should be treated as a common carrier and that since the goods carried are all hydrocarbons, the rate for each component part should be the same and the cost distributed in relation to the volume delivered to each customer. Argument was addressed to the Board that any allocation on a different basis from that suggested would amount to discrimination. Madison in its gathering and compression essentially has two customers - Royalite and Canadian Western. It delivers wet gas to Royalite for absorption purposes and it delivers an entirely different product to Canadian Western. In Royalite Oil Company v. Major Oil Investments, 1941, 3 W.W.R. 18, the

functions of this wet gas gathering system and the final result were discussed. In that case, Hon. Chief Justice Harvey pointed out that Royalite contended (and he adopted this contention) that the purpose of the gas gathering system was primarily the extraction of natural gasoline and its secondary purpose was distribution for fuel purposes. He further pointed out that Royalite contended that the gas gathering system was quite distinct from the system of distribution. The learned Chief Justice at Page 23:

> "It seems quite plain that the contents of the gathering pipe line is something quite different from though including what is delivered ..... <u>and it would appear to be of no importance that the absorption and scrubbing plants are owned by the appellant instead of by some other person.</u>"

The underlining is the Board's. Reference may also be made to Structure Oil and Gas Company v. Royalite Oil Company, 1943, 2 W.W.R. 49.

The irresistible conclusion is - the hydrate problem notwithstanding - that for a period of at least five years the gas gathering system was designed to supply the absorption plant with its raw material and Royalite was in the fortunate position of having a market for a fraction of the residue gas. When crude oil was discovered in 1936, very few of the crude oil wells were connected to the absorption plant.

We then have this situation - a gathering and compression system designed for the absorption plant and carrying to the absorption plant a volume of raw material which up until 1938 was not related to the residue market

but which was so related after 1938. The residue product is quite different from the substance which entered the plant so that the volumetric basis can have little if any application in allocating the costs for the gathering of one substance and the delivery of a different substance. If the system delivered 15 per cent of its load to the absorption plant and 85 per cent directly to the residue market, different considerations might apply. That, however, is not the case for in fact the total load of gathered gas is delivered to the absorption plant, without which it could not operate. It was suggested by Canadian Western that the division of costs between the two parties should be determined by the factor $\frac{100}{185}$.

For the Attorney General, submissions were made based upon the actual operating costs for 1944, adjusted as to the rate base, the measure of depreciation and rate of return advocated by his representative during the hearing and in argument. The total cost of gathering is shown as $383,840.00 which is allocated between the absorption plant and the market in the proportions of 40 per cent and 60 per cent respectively, and the figures are $153,536.00 and $230,304.00.

Mr. Zinder dealt with this problem and stated that costs might be allocated on the basis of (1) benefit, and (2) cost behaviour. He suggested that the benefit basis involves intangible factors not subject to ready measurement and that any such allocation would largely be a judgment process and is a method seldom used in the utility field. This view was not concurred in by Counsel for B.A. Utilities, who during his argument said: "the principle of seeing that the cost is borne by the parties who benefit to

the extent of the benefit, is, we believe accepted by all parties." And later he said "The benefits to other parties concerned, as covered earlier in this argument, must be properly assessed and the resultant value then obtained for the consumers of gas." The Board and all parties to the hearing recognized the difficulty of measuring the benefits which will accrue to those concerned but these statements made by counsel commend themselves to the Board. In his argument, Counsel for Madison referred to Rickett Smith v. Midland Railway Coy. (1896) 65 L.J. Q.B. 274 where Collins, J., at p. 274 says:

> The affluence or indigence of the person rendering or receiving the service is beside the question. The reasonableness of the charge must be measured by reference to the service rendered and the benefit received."

Mr.Zinder's opinion was that "it would be fair to charge such gathering costs as are essentially proportionate to the capacity of the system to each use in proportion to their responsibility for such capacity", which he states is 15 per cent. This passage in his evidence is somewhat obscure and the Board has difficulty in following it. If, however, he assumes that the capacity of the absorption plant was originally related to market demand his premise is wrong and his conclusion equally wrong. Then he went on to say that he would further charge the absorption plant with such part of the operation costs as are proportionate to the volume of gas pumped as the volume of gas actually used in the absorption plant bears to the actual volume of gas used up to that point. On being asked to explain this theory he referred to Exhibit

140 where the results of such an allocation were shown. In that allocation he divides costs on the basis of demand and volume. The total costs as estimated by Madison amount to $515,226.00 and he allocated $303,812.00 as the demand portion and $211,454.00 as the volumetric portion. In these divisions depreciation, taxes, and return on investment are included in the demand column and all other costs in the volumetric column.

He then apportions 9 1/2 per cent of the total to the absorption plant, 94.6 per cent to the market and 3.6 per cent to repressuring. He used similar methods in his suggested allocation of B.A. Utilities costs.

Substantially he adopts Madison's final submissions except with respect to the small item of repressuring costs and since these costs are to be borne by the market there is no difference between his and their allocation. The Board has been unable to detect the application of the statement first before referred to.

The arithmetic calculations made by the witness can be followed and understood but the principle upon which the calculations are made is difficult to follow and Counsel in opposing interest experienced the same difficulty as did the Board.

It may be that the benefit method of allocation is not generally used in Mr. Zinder's experience and it may be that any result arising from its application will be a judgment figure but at the same time it is doubtful if any comparable situation has ever confronted an administrative tribunal. Witnesses with continent wide experience in natural gas matters appeared before the Board and if they knew of any parallel case they did not disclose it.

It is quite clear that absorption gasoline is a necessary material used in refining operations and that all of the products in the Turner Valley absorption plants are sold to Imperial Oil, Madison's parent company, or to B.A., the parent of B.A. Utilities, or are used by G.O.R. in its own refinery. The profit made or the loss sustained in absorption plant operations is purely a book-keeping concept and is directly related to the price paid for the product in a "one man market". The evidence indicates that if this product were purchased in the United States, the cost laid down in Calgary would be more than double the price paid for the Turner Valley product. The Board must consider the statement made by Counsel for B.A. at the opening of the hearing - and not denied or objected to by any other of the interested parties - that natural gasoline was vital to oil refineries. Since there is no free market for Turner Valley natural gasoline, the question of profit of loss arises only in the end result of the various companies' operations. Departmental statements relating to combined operations by integrated companies exhibit figures only but do not establish the final result although they have value in arriving at a decision based upon what is just and reasonable. If the Board made its allocation on the basis of the use made by the absorption plant of the facilities of the system, it could properly allocate the whole cost of gathering and a proportion of the compression costs to the absorption plant. The Board, however, hesitates to apply a judgment figure when direct evidence is available and it is, therefore, of the opinion that it can safely and properly adopt the allocation made by Royalite itself before the separation of its natural

gas division from its other operations and allocate costs as to 40 per cent thereof to the absorption plant and as to 60 per cent thereof to the residue system.

British American Gas Utilities Limited

The Board is confronted here with an entirely different situation from the one just discussed. The British American wet gas gathering system was designed and constructed for no other purpose than to serve the absorption plant. The plant and the gathering system were geared to the volume of gas available at a pressure of not less than 150 pounds, no compression being required. The gathering system now in use - as authorized by the Board as a result of representations made and estimates submitted - involves the gathering of gas which must be compressed to a pressure at which it can be delivered to and processed in the absorption plant. Thus, in the British American system there is a high pressure system and a low pressure system. In addition, a high power compressor is required to raise the residue gas to a pressure at which it can be delivered to the Madison scrubber and to return to the formation surplus gas not required for the market. Again it must be pointed out that production conditions in the B. A. area are precisely the same as in other parts of Turner Valley. That area was and still is primarily an oil field and it is only because of the enactment of The Natural Gas Utilities Act that there is a market for some of its residue gas. B.A.Utilities operates so that all wells connected to its system are produced to the full extent of their allowable production and since the amount produced exceeds its market share of the gas so produced, the excess

must be returned to the formation. Mr. McCutchin at first estimated that plant shrinkage and fuel would account for 22 per cent of all gas processed in the absorption plant and that one-half of the balance would go to market and one-half would be repressured. Later he reduced his shrinkage factor to 13.3. There is an essential difference between B.A.Utilities' repressuring operations and those of Madison. In both cases, the represssured gas is delivered to the gas cap formation. Royalite's gas cap is shut in except for peak load periods, whereas B. A. will produce to the extent of allowables but since allowables are related to pressures and since repressuring will tend to minimize pressure drop, and since repressured gas will be reproduced and some of it again returned to the formation, the operation is more in the nature of recycling than for repressuring for storage, and in the recycling process gas will be lost.

Subsequently, a witness, in his estimates, provided for a payment from B.A. to B.A.Utilities of an amount equivalent to 15 per cent of the operating costs of the gas gathering lines. This represents ten per cent shrinkage on the absorption process and five per cent for fuel used. On the figures submitted, B.A. would make no contribution towards compression costs.

The witness estimated that the high pressure system alone would have processed 18.57 billion cubic feet of gas and that the low pressure system will handle 31.75 billion cubic feet. It is admitted that a main consideration inducing British American to install the low pressure system was the extension of the life of its absorption plant and in the furnishing of gas to theresidue market. From the additional 31.75 billion feet made available

through the installation of the low pressure system, the company may expect to get a yield of from .27 to .38 gallons of 26-pound product per M.c.f., the Turner Valley posted field price for which was, at the time the evidence was given, $2.28 per barrel, or .53 gallons of 45-pound product, the posted field price being $1.84 per barrel. Until B. C. Utilities commenced operating, the absorption plant carried the total cost of gathering wet gas and now that its lifetime is extended at least two and one-half or three times its original expectancy, it proposes to charge the absorption plant with fifteen per cent of the gathering costs. The low pressure compressor performs as great if not a greater service than the gathering lines and it is quite clear that without compression, the low pressure gas would never reach the plant. In the Board's opinion, therefore, and it so directs, the gas gathering system must be considered as being composed of the high and the low pressure gathering lines and the low pressure compressor station.

It might be pointed out that British American might very well have reduced the working pressure of its absorption plant. Had that been done the heavy cost of the complete low pressure system would have been avoided with its consequent impact on the cost of delivering residue gas to the scrubbing plant.

On its suggested computation of depreciation, its estimated costs of operation, including rate of return, the cost of B. A. Utilities' gas delivered to the market is approximately 9.25 cents for the year 1945, to which there must be added the scrubbing costs and the well-head price paid to producers. The Company had no submission

whatever to make as to the division or allocation of costs other than the 15 per cent already mentioned. It was admitted that the installation of the low pressure system was a prime necessity for the company, and that the producers, the consumers, including the British American Refinery, and the absorption plant, gain some benefit. B. A. Utilities' first submission was that the consumer of residue gas should pay all of the costs but this was later modified to the view that those who receive service should pay for it and the witness left it to the Board to say how the allocation should be made.

He agreed that his company went into the scheme primarily on the basis of self interest and that the second consideration was the Conservation Board's requirements respecting the use of the low pressure systems. This Board has no knowledge of any requirements of the Conservation Board. If that Board has any requirements they have not been placed before us. All this Board knows is that the capital estimates and estimated operating costs prepared by B. A. were presented to this Board and arising out of these estimates the scheme was authorized. As it happens, the original estimate of operating costs as presented to the Board turned out to be erroneous.

British American Oil proposes to charge the utility with the annual sum of $15,000.00 to cover general costs of administration. When the absorption plant was merely a division of the company, no such charge was made. Why such a charge should now be made merely because a subsidiary company has been incorporated to handle the gas division, is difficult to understand. This item will not be allowed, but B. A. will be entitled to charge B. A.

Utilities with specific items of expense actually incurred.

The Board must consider cost allocation of British American's various activities on a different basis from that applicable to Madison. Madison's gathering and compressor system have always served a dual purpose and the cost allocation adopted by Royalite prior to the incorporation of Madison has been adopted as being properly applicable to Madison. The British American high pressure lines in the past served one purpose only and to allocate costs on the basis now suggested would result in a fortuitous gain to the absorption plant of 85 per cent of the cost of operating the high pressure lines. These lines serve the absorption plant today in precisely the same fashion as they always have done and the Board cannot overlook the fact that, notwithstanding the incorporation of the utility company, the whole operation is an integrated one.

The low pressure gathering system (lines and field compressor station) presents some difficulties and the allocation of cost can only be determined on some judgment principle. The original submissions made by the company respecting the price at which they could deliver gas, must be taken into consideration. British American's final submission (Exhibit 164) shows that the cost of gas delivered to the market in 1945 was 8.82 cents per M.c.f. and this price does not include the cost of scrubbing or the well-head price to be paid to the producers. This cost is substantially greater than the amount originally submitted to the Board and is greatly in excess of Madison's price.

In this area of the field, the positive evidence is that oil producers will benefit by increased production

through the repressuring of the field and due principally to the formation in this area being different from the formation in the Royalite gas cap, where Madison's gas is repressured. Producers connected to the high pressure system will now get revenue from residue gas and from natural gasoline for a period of at least seven years longer than they anticipated. Producers connected to the low pressure system will receive revenue from natural gas and natural gasoline which they did not previously enjoy. The life of the absorption plant will be extended and finally a reserve has been made available to the residue market.

The residue gas line will transmit ultimately all of the marketable reserves in that area and consequently the residue market must bear the cost of operating the line - that is from the discharge at the high compressor station to the scrubbing plant.

Of the amount of gas delivered to the high pressure station, approximately one-half will go to the market and one-half will be repressured, although these proportions will vary as time goes on and the amount to be repressured will decrease but the high pressure compressor will finally deliver all the marketable reserves to the market.

The low pressure system will deliver to the absorption plant over the life of the project approximately 31 billion cubic feet, as against 18 billion cubic feet from the high pressure system. Again, however, the low pressure system will ultimately provide for the market approximately 22 billion cubic feet more than if the system had not been installed.

Now, if the matter of compression were one purely for the purpose of delivering gas to the residue market, there would be no problem. That, however, is not the case. Low pressure gas must be compressed to suit the working pressure of the absorption plant and so there must be an allocation of the cost as between the two. The evidence leads to the conclusion that the allocation must be to some extent arbitrary - or as Counsel for the producers pointed out - a judgment figure. Fairness alone and not mathematics must be the yardstick.

In argument, Counsel for British American suggested that the proper allocation of costs should be for the first ten years on the ratio of:

1.	Market	$1,749,332.91
2.	Others	717,500.22
		$2,466,833.13

or, in other words, that the residue market should bear approximately two-thirds of the total costs. In this connection, unit costs must be considered. It was shown that the total price of the gas to the market was 8.82 cents per M.c.f. The estimate originally presented by the company showed a cost of 6.32 cents for 1945 and an average price of 3.41 cents for the ten year period. Should consumers be called upon to pay these prices when others gain benefits from the installations made?

The Board has read and re-read all the evidence submitted and has considered the many and voluminous exhibits filed by the various parties in support of their conflicting theories. To say that the total costs (excepting 15 per cent of the cost of gathering) should be

assessed against the residue market, or alternatively that the market should bear two-thirds of the total costs, is, in the Board's opinion, unjust and unreasonable.

For the producers, it was submitted that the total cost of gathering, compressing and repressuring should be allocated:

Absorption Plant	Repressuring	Market
26%	17%	58%

The incidence of repressuring costs was left open by Counsel but obviously the burden must fall on the producers or the consumers or must be divided between the two.

For the Canadian Western it was argued that, for the reasons already dealt with by the Board, sixty or seventy-five per cent of the costs of the British American utility system should be borne by the absorption plant but it is conceded that costs of the residue transmission line should be borne by the market and that the cost of the high pressure compressor station should be allocated between compression and repressuring.

For the City of Calgary, it was suggested that the price to be fixed by the Board should not be a well-head price but a price determined at the inlet of the scrubbing plant and inferentially that no allocation should be made of the costs arising between the well-head and the scrubber. At the same time, the City appeared to adopt the arguments advanced by Canadian Western that if any allocation should be made, it should be on the basis of seventy-five per cent to the absorption plant and twenty-five per cent to the market.

Figures were submitted on behalf of the Attorney General respecting B. A. Utilities' costs, the rate base, depreciation and rate of return first being adjusted as in

the case of Madison. The submission made is that gas gathering costs including the whole compression costs should be allocated as to 40 per cent thereof to the absorption plant and as to 60 per cent thereof to the market, and that all other costs be allocated to the market with a credit to the market for any revenue derived from the residue transmission line. These various submissions have been given consideration by the Board in arriving at its conclusion and in addition the Board has considered matters which, at the risk of being tedious, it proposes to recapitulate:

(1) The representations made to the Board resulting in the granting of an order authorizing the installation of B. A. Utilities' system was that in 1945 the unit price of gas would be 6.32 cents, whereas the actual cost was 8.82 cents. The Board does not overlook the fact that this latter figure is computed on a larger rate base than is being allowed and upon a net return of 9 1/2 per cent per annum, as opposed to 7 per cent per annum allowed, and upon a cost allocation of 15 per cent to the absorption plant and 85 per cent to the market. Even if adjustments are made in these factors to conform with the Board's findings, the approximate figure for 1945 is approximately 7.8 cents per M.c.f., which represents a substantial increase over the original estimates.

(2) The high pressure lines were designed to serve the absorption plant alone.

(3) The high pressure gathering lines have been included at historic cost, using unit accrued depreciation to reach the final valuation.

(4) The life of the absorption plant has been trebled.

(5) Depreciation is being allowed on a basis which substantially reduces the risk of the investment and this being the case, the rate of return allowed might very well have been slightly less than 7 per cent per annum.

(6) Repressuring in the British American area is not repressuring for storage but is a recycling operation designed to benefit oil production, natural gas production and the absorption plant, but in recycling gas will be lost in each operation.

(7) Producers will receive revenue from natural gas and natural gasoline which they never would have received but for the adoption of this scheme.

The cost of gas gathering and of operating the low pressure station will be borne as to sixty per cent thereof by the absorption plant and the balance of forty per cent will initially be charged to the market. Twenty per cent of the low pressure costs will be borne by producers. Eighty per cent of the high compressor station costs and the repressure line costs will be borne by the market and twenty per cent by the producers. The total costs of the residue transmission line will be borne by the market subject to a credit for any revenue received from the transmission of G.O.R. gas. Until further order Madison shall pay to B.A. Utilities on or before the 20th day of each month commencing with the 20th day of January, A.D. 1947, the sum of One Thousand dollars ($1,000.00) for gas transported through its residue line for and on behalf of Madison from the Hartell Junction of the B. A. Utilities' residue line and the discharge line

from Madison's compressor station, provided that any line loss suffered between Hartell Junction and Madison's scrubbing plant shall be borne by the two companies in proportion to the respective amounts of residue gas delivered by them into the residue line at the Junction.

Out of the monies received from Madison in payment of the basic well-head price, B.A. Utilities will debit the producers and credit the market costs with the foregoing proportions, before making distribution to the producers.

To illustrate and using the figures submitted in Exhibit 194 for the year 1945, without accepting these figures as being correct and using this Exhibit merely because there appears in it a more detailed break-down of costs than appears in Exhibit 184, we find the following:

	Total	Market	Absorption Plant	Producer
Gas Gathering - 40% to market) 60% to absorption plant)	$52,743	$21,097	$31,646	
Low Compressor Station - 20% to market) 60% to Absorption plant) 20% to Producers)	57,628	11,526	34,576	$11,526
High Pressure Compressor Station - 80% to Market) 20% to Producers)	69,660	55,728		13,932
Repressure line - 80% to Market) 20% to Producers)	12,310	9,848		2,462
Residue Transmission Line - All to market	51,968	51,968		
	$244,309	$150,167	$66,222	$27,920

These figures include water and fuel scrubbing costs.

The Board is taking into account the fact that if gathering, compression and repressuring costs should be allocated only between the market and the absorption plant, then the producers who vigorously advocated adoption of the B. A. scheme would reap their benefits all at the expense of the market. On their submissions, it seems clear that they do not seek to avoid responsibility for part of these costs although their conception of that responsibility may not accord with the Board's ideas.

These allocations are made so that the incidence of costs will fall as equitably as possible on those who make use of and benefit by the installations made and the Board has attempted to measure the charges to each party interested with reference to the service rendered and to the benefit received.

It is realized that the allocation here directed could lead to "loading" costs to one operation at the expense of another. A careful scrutiny of all these items must be made from time to time, not that the Board expects any "loading" to be done but so that it may be able to demonstrate that it has not been done.

GAS AND OIL REFINERIES LIMITED.

At the commencement of the hearing, G.O.P. submitted a scheme to the Board which was designed to gather high and low pressure gas produced in its area, and, after providing for fuel, the company proposed to deliver its market share to the market and to repressure the balance in suitable wells adjacent to its plant. The estimated total new capital investment was $249,882.00, without working capital. The annual operating cost was

estimated to be $133,560.00 on the basis of a 4-year write-off of $121,040.00 on a 5-year write-off. The daily amount of gas available for sale or repressuring was estimated at 6.130 M.c.f.

The Board did not consider the scheme to be economically feasible and made no order respecting it. At the same time, there was an appreciable volume of gas being flared at the plant and Madison was directed to install a compressor unit at its No. 3 plant, to lay a suction line to the G.O.R. absorption plant and a discharge residue line from the compressor station to a point in the British American residue transmission line, whence the market share goes to the Madison scrubber and the balance is repressured in the Royalite gas cap. Notwithstanding this installation, gas will be flared at this plant for some time. The cost of compressing the total volume of gas available at the outlet of the absorption plant did not warrant the installation of compression machinery for the utilization of the total volume. It is unfortunate that gas must beflared for a time and it is equally unfortunate that producers, whose gas is flared, must suffer a loss in that respect. At the same time, they will receive revenue which they never received before from that portion of the gas which is transmitted to Madison.

G.O. R. in its estimate based upon its cost submissions, arrived at a price for gas at the outlet of the absorption plant as follows:

1945	1.3771 cents
1946	1.3775 cents
1947	1.3780 cents
1948	1.3787 cents

If these figures are accepted, then, using the figures prepared by the Board's Auditors, the result for the year 1945 would be:

Gathering	1.3778 cents
Repressuring	.352
Transmission	7.015
Scrubbing	1.821
	10.5658 cents
Well-head price	3
	13.5658 cents

This figure represents an increase of seventy-five per cent over the price presently being paid by Canadian Western.

G.O.P. commenced the operation of its absorption plant in 1936. In 1943, the company sold its oil refinery and absorption plant to G.O.R. The sale price was based upon a valuation made by General Appraisal Company Limited but the basis of the appraisal is not known.

The value of the wet gas gathering lines was given as $184,199.22.

It was submitted that the cost of gathering the gas would be:

Annual operating costs	$2,049.50
Annual administration expenses	2,136.23
	$4,185.73

These figures include the cost of operating the domestic system. These are necessarily only relative figures since the company conducts a unit operation and does not keep separate records for its various departments.

Mr. Hamilton, the Board's Auditor, and Mr. Scrimgeour, Accountant for G. O.R., attempted to arrive at the historic cost of the gathering lines but could not arrive at any conclusion satisfactory to either of them. It could be deduced from the figures furnished by the company that the unit costs used in the appraisal of its property were substantially higher than units costs used by Mr. Hill in his valuation of the Madison property.

The submissions made by Gas and Oil Refineries Limited with respect to the whole problem are as follows:

"Our opinion has been requested as to the apportionment of total wet gas gathering costs between absorption plants and residue dry gas. In our opinion the total costs of gathering wet gas should be included as part of the operating costs of the absorption plant and the revenue from the sale of residue dry gas should be added to the revenue derived from the sale of absorption gasoline, high vapour pressure gasoline and any other by-products which may be now or hereafter recovered from wet gas. The product transported by the gas gathering lines is a mixture of dry gas and casing-head gasoline and it is only after this mixture has been processed by the absorption plant that these component parts are separated. Total costs of operating the absorption plant and maintaining the gas line are recoverable from the revenue derived from the sale of all products contained in the wet gas and we can see no advantage in complicating monthly calculations to apportion relative costs to separate revenue, as the same well operator receives

his share of all revenues, whether on an 80/20 basis or such other basis as may be determined by the Board.

"As an alternative suggestion we submit the basis in effect for oil and gas fields in certain areas of the United States and incorporated in agreements of the Natural Gasoline Association of America whereby the revenue from sale of dry residue gas is divided on a 50/50 basis between absorption plant and well operator in the ratio that his dry gas content in the wet gas delivered bears to the total."

Neither of these suggestions commend themselves to the Board and they cannot be accepted.

The Board then is faced with a situation where there is no satisfactory evidence respecting original or reproduction cost which would permit the construction of a rate base for G.O.R. on the basis used in the case of Madison and British American. Its gathering lines in the past served the sole purpose of gathering wet gas for delivery to the absorption plant and the only difference between its presentoperations and those carried on prior to the enactment of the Statute is the additional accounting which will be required in distributing to producers their share of the well-head price.

Since a rate base cannot be fixed, the Board has no alternative but to allow G.O.R. an amount which will represent gathering and accounting costs and the amount will be fixed at three-quarters of one cent for all gas delivered to the residue market. Residue market shall not include any repressured gas from G.O.R. and no allowance shall be made to G.O.R. for gathering such gas as may be repressured. This amount will be deducted and retained by G.O.R. from the well-head price received by it from

Madison before distribution to producers. It must be pointed out that the transmision and compression costs for gas from the G.O.R. system are abnormally heavy, which is largely due to the small amount of gas transmitted to the Madison scrubber. The absorption plant operates at a working pressure of 75 pounds. The gas must be transported to the Madison compressor station where it is compressed to a pressure sufficient to transport it to the B.A. residue line, thence to the Madison scrubber. Madison will be entitled to deduct from the basic well-head price payable to producers in the G.O.R. area one-quarter of one cent, only for gas delivered to the residue market as above defined, and this amount will be credited to the total costs of transmission and compression of the G.O.R. gas.

In effect, the foregoing allocation means that producers in the G.O.R. area will receive a net well-head price of Two (2) cents per M.c.f.

The Company sells gas for domestic use to consumers adjacent to its refinery. The lines servicing these consumers are appraised at $20,242.72. This system will only use small quantities of gas, which for the purposes of general consideration will not be taken into account in this decision. G.O.R., however, must prorate the gas used in the domestic distribution service between the various producers and must pay the basic Three (3) cents well-head price for that gas. Failing agreement between the consumers and G.O.R. on the consumer price, there must be a reference to the Board of Public Utility Commissioners, since retail prices are under that Board's jurisdiction.

ABSORPTION PLANTS

1. Royalite Oil Company Limited :

Section 72, Subsection (3) of the Statute is in the following terms:

"Notwithstanding the terms of any contract between the owner or producer of natural gas and the operator of any absorption plant the Board shall by order fix and determine the proportion of the price received by the operator of such plant to be paid by him to such owner or producer for the gasoline or other hydrocarbon content of such natural gas, or, if such gasoline or other hydrocarbon content is retained by such operator, the equivalent of the proportion of such price."

Under existing contracts, producers delivering to each of the three absorption plants receive twenty per cent of the gross proceeds from the absorption products and all operating costs are paid by the operators out of the eighty per cent retained by them.

A statement filed by Royalite shows the operating results of the two absorption plants operated by it for the years 1939 to 1943 and for the year 1944 for the No. 1 plant with which the No. 2 plant has been consolidated. The average annual earnings represent 10.49 per cent on the capital invested.

A further statement was filed wherein profits are estimated for the period from 1945 to 1948, inclusive, and represent an average annual earning of 5.33 per cent on the invested capital. If these figures are accurate, the average earning for the 10-year period is 8.84 per

cent. The statement for the years 1939 to 1948 is not taken from the company's books but is built up from the books by allocating general costs to the various operations of the company. Much might be said respecting the method of valuing the plant for the purposes of these statements, the method of computing depreciation, and the inclusion in depreciation calculations of buildings and material which still remain at the discontinued No. 2 absorption plant. Even if the figures submitted are accepted by the Board, they will be offset to some extent by the effect of the cost allocation ordered by the Board.

It would appear further that profits (using Royalite's basis of calculation) may decrease if the manufacture of the present absorption products should be discontinued after this year. The Board is of the opinion that it has no power to revise the absorption plant contracts on the basis of past performance and so at the moment will not alter the present division between the absorption plant and the gas producers.

2. <u>British American Oil Company Limited</u>

The total amount received by the Company for absorption products from 1936 to the end of 1945 is shown to be $1,435,054.26. The amount paid to the producers in the same period was $281,007.00. Operating expenses for the same period amounted to $941,798.00, including depreciation, or $590,960.00 without including depreciation. The net operating revenue for the period was $75,437.39 before income tax. The final figures for 1945 had not been completed at the time the evidence was given but were estimated at $74,599.40, without provision for income tax.

This situation may now change by reason of the additional volume of gas which will be processed as a result of the installation of the low pressure gathering system and to some extent may be affected by the Board's cost-allocation. At the moment, however, there is no evidence before the Board to justify any change being made in the proportion of absorption product paid to producers.

3. Gas and Oil Refineries Limited:

It is submitted by this company that when it purchased the absorption plant, the refinery and gathering lines from G. O. P., the purchase price was based upon an appraisal made by General Appraisal Company of Vancouver. The absorption unit, including gas gathering lines, water lines and domestic dry gas lines, was appraised at the sum of $668,774.36. If the gathering and domestic lines are deducted, the appraisal of the absorption unit is $464,332.41. The operations of this company are integrated and in its accounting system separate records have not been kept for each operation.

There was submitted to the Board a comparative operating statement for the years 1943, 1944 and 1945, which, without providing any amount for gas producers, shows a total deficit for the period of $260,482.03. This result is due to the fact that the plant is operating only at about fifteen per cent of its capacity. Again much could be said respecting the appraisal of the plant, the depreciation factor used, and the annual repayment of capital investment, but it is doubtful if any figure could be arrived at which would justify the Board making any revision at this time. These matters, of course, can all be reopened at any time by any interested party.

APPLICATION BY L. L. PLOTKIN

In March 1946, while the hearing was in progress, an application was made to the Board by Mr. L. L. Plotkin. In general, his proposal was that he should be permitted to use gas from three wells operated by him for processing on his own lease. In addition he indicated that he had secured options on wells in the north end of the field and it is assumed that upon exercising his options he could use the gas from those wells for processing. He further indicated that there were low pressure wells in the vicinity of his three wells and that he could make use of the gas from these wells.

His evidence is that by his method of processing he can recover about one gallon per M.c.f. of high blending stable gasoline. After processing, the residue gas, sulphur free, would be available for the market. He stated that he obtained the options on the wells in the north end of the field two and one-half years ago before any plan had been inaugurated under The Natural Gas Utilities Act and in fact it would appear as if he had secured these options prior to the enactment of the Statute.

Mr. Plotkin appeared at the hearings held by the Board in May 1944 and took part in the proceedings. He, however, made no reference to the options referred to nor did he make any mention of the process or the scheme which he now has under contemplation. At that time he was aware of the plans which had been submitted to the Board by the three absorption plant operators in the field and his cross-examination of several of the witnesses indicated that he did not agree with the economics of these schemes.

The application is quite vague. No figures as to gas volumes were submitted. No reference was made to the fact that the schemes inaugurated by the Board were related to known reserves and that investments were authorized accordingly. Two of his wells are presently connected to the G. O. R. gathering system, although he has no specific agreement with G. O. R. in that respect. He indicated that he merely permitted them to lay a temporary line to his wells and take delivery of the gas but that he paid no attention to the amount paid to him for the privilege. He did not know and could not give information respecting the wells on which he had options and did not know whether they were connected to any gathering system or not.

After processing of the gas had been completed in his plant, ninety per cent of the volume entering the proposed plant would be available for the market but since the plant would operate practically at atmospheric pressure, a compressor would be required to make the residue available to the market. The residue would be completely desulphurized and would contain none of the lighter hydrocarbons so that it would either be necessary to lay a line from his plant to the Canadian Western system or to throw the purified gas into the stream going to an absorption plant and again to the scrubbing plant. As already pointed out, residue gas from G. O. R. is compressed and transported to the Madison scrubber and substantial costs have been incurred for that purpose. Any gas now connected to a gathering system cannot be withdrawn except upon terms, and consideration must be given to the disposal of residue gas in case the gas withdrawn

is not fully utilized.

In the meantime, Mr. Plotkin's application must be refused but he has the right to reapply.

APPLICATION BY HOME OIL COMPANY LIMITED

On 28th February, 1947, Counsel for Home Oil Company Limited (hereinafter referred to as "Home") made an informal ex parte application to the Board and asked that he be given an opportunity of presenting argument respecting the well-head price of gas as fixed by the Board, which he considered to be inadequate. The Board took time to consider the application and finally came to the conclusion that it must be refused.

Home is a producer of natural gas in the Turner Valley field, delivering its output to the Madison Natural Gas Company Limited. It was given notice of the commencement of and was represented by Counsel during that part of the hearing which took place in May 1944. It received notice of the resumption of the hearing in January 1945 but did not appear or take any part in any of the subsequent sessions. Evidence was led before the Board intermittently in 1945 and 1946 for a total of seventy-five days. In June 1946, the Board heard argument by Counsel for ten days and the hearing was closed. The present applicant received a copy of the daily transcript of the evidence, and of the arguments of Counsel and knew or should have known the nature of the evidence adduced and the arguments presented but made no effort to place its position before the Board either by the introduction of evidence or by argument. It was not until weeks after

the Board's Order dated 30th December, 1946, fixing the price of gas at three cents per M.c.f., was issued, that Home made its present application. There must be some finality to any type of proceedings and to reopen the hearing at this stage and under all the circumstances is not warranted. The applicant had its opportunity but failed to take advantage of it.

PROCEEDINGS FOLLOWING UPON THE BOARD'S ORDER NO. 32, dated 30th DECEMBER, 1946

On 30th December, 1946, the Board, pending the completion of its decision, made an order whereby inter alia the basic well-head price of gas was fixed at three cents per M.c.f.

The great volume of evidence adduced and the mass of intricate figures and calculations scattered throughout the evidence and the exhibits (not always in sequence) rendered it quite possible that errors in matters of detail might be found in the decision. The Board, therefore, took the unusual course of distributing to Counsel a draft of its decision in order that Counsel, their accountants and engineers might have an opportunity of checking all details and having errors correct, if any were found.

On 23rd January, 1947, the Board met Counsel and several matters of detail were adjusted. On one point raised by Royalite, the Board felt that Counsel should have an opportunity of presenting argument. The point is this. In preparing the schedules attached to its decision, the Board allocated to Royalite forty per cent and to Madison sixty per cent of the cost of gathering and compressing

wet gas for the years 1945 to 1948, inclusive. In its Order of 30th December, 1946, already referred to, the Board provided that the price to be charged by Madison to its customers for natural gas should be nine cents per M.c.f. from and after 1st January, 1947, and specified the price to be paid in the various areas of the field for gas purchased from and after 1st January, 1947. Counsel for Royalite takes the position that the Board has discriminated against Royalite.

In its arithmetic application of cost allocation, the Board charged Royalite the sum of $312,209.00 for wet gas gathering and compression for the period 1st January, 1945, to 31st December, 1946. In that same period, Madison, pursuant to an informal arrangement, charged Royalite $52,048.00 for these services, which amount represents five per cent of the gross value of absorption gasoline recovered by Royalite from the wet gas. By reason of these charges and the Board's computations, Madison's revenue for the four-year period may fall short of providing for the cost of operation, depreciation and rate of return by the sum of $260,161.00.

On the other hand, if Madison has placed itself in such a position that it cannot recover this amount from Royalite and if it is entitled to receive payment at all, the only source from which that payment can be obtained is the ultimate consumer.

Discrimination to be unlawful must be unjust or unreasonable and the two points for decision then are - is there discrimination and, if so, is it unjust? Discrimination only arises when unjustly different rates are charged to customers for the same class of service. It

might be said that there is discrimination as between Madison and Royalite in the allocation of gathering and compression costs but on account of the difference in the circumstances which have already been referred to in this decision, there is no unjust discrimination. If two different companies are accorded different treatment, then if the difference is based upon widely divergent conditions which logically and equitably justify that different treatment, then the discrimination is not unjust or unfair. The price of nine cents to be paid to Madison by its customers is a price for a commodity, whereas the charge to Royalite is for a service rendered.

But it is said that the discrimination arises because the cost allocation for a service rendered was applied retroactively, whereas the prices for purchased gas and marketed gas was not so applied. Counsel for Royalite referred to Exhibit 70, which is made up of an exchange of letters between Royalite and Madison, in which the five per cent allocation was agreed upon between them. The Board has referred to the transcript and finds that these letters were produced by Mr. Kirkpatrick in April 1945 but the text of his evidence only deals very sketchily with the arrangements expressed in the letter as they affect the transfer of gas production contracts, and the contract with Canadian Western. Apart from producing the Exhibit (which was not read into the record), the witness made no specific mention of cost allocation.

The Board must also point out that its Order No. 8, approving the transfer by Royalite to Madison of certain assets, contained a provision:-

"Provided always that the approval hereby given shall not be deemed as extending to or including approval of the consideration passing between the parties to the said agreement as set forth therein, nor shall the approval hereby given, bind, affect or prejudice the Board in any determination by it of the rate base to be fixed for the Madison Natural Gas Company Limited or of the rate of return to be allowed thereon, or in its determination of any or either rates which the Board has power to fix and determine under the provisions of The Natural Gas Utilities Act, or to bind, affect or prejudice the Board in the exercise of any jurisdiction which it may have under the provisions of the said Act, other than its jurisdiction under Section 52 (1) (g) thereof."

The Board thereby safeguarded the status quo and prevented the mere formation by Royalite of a subsidiary company and a sale of assets to it from operating so as to create or permit the creation of a position which would enable the parent or the subsidiary to secure any undue advantage. If it be assumed that Madison had not been formed then the Board's duty would be to allocate the costs as between the two divisions of Royalite and it would not be bound by any allocation made by the company for its own purposes. Its duty would be to ascertain not what the allocation was but what it should have been:

Section 52 (1) (a) of The Natural Gas Utilities Act provides:-

"No proprietor of a public utility shall, --

(a) make, impose or exact any unjust or unreasonable,

> unjustly discriminatory or unduly preferential individual or joint rate, commutation rate, mileage or other special rate, charge or schedule for any product or service supplied or rendered by it within this Province."

It therefore was the duty of Madison to enter into a contract with Royalite in accordance with the provisions of that section and, in the Board's opinion, Madison failed in that duty.

At the hearing on 22nd May, 1945, Mr. Latham, a witness on behalf of Royalite, stated that costs should be divided in proportion to respective revenues; that this method is one of the generally accepted methods of allocation and that apparently there is no method more equitable. In his evidence given on 17th April, 1945, Mr. Kirkpatrick stated that prior to the separation of Madison and Royalite, gathering line costs were divided on a basis of gross realization from the two plants. Notwithstanding that evidence, Royalite and Madison continued in force an arrangement made between them shortly after the incorporation of Madison but before the enactment of The Natural Gas Utilities Act. That arrangement, in the Board's opinion, was unjustly discriminatory in favour of Royalite, Madison's parent company. On the basis of sales realization - no method being more equitable - Royalite's share of the costs for 1945 and 1946 would have been $312,209.00. Under the bargain made the cost to Royalite was $52,048.00. If the former was equitable, the answer to the latter is obvious.

It could hardly be contended that Madison would be permitted to give Royalite service for nothing during the period mentioned and it would seem to the Board that Madison's duty was either to apply to the Board for an interim cost allocation or to have continued in force the same allocation as had been employed before the separation of the two divisions of Royalite.

If Madison has contracted in such a fashion that the allocation of costs is unfair to the consumer of its products and unduly preferential to its parent company, it is the duty of the Board to take such factors into its consideration of the rates which the consumer should pay.

It may be that the Board has no jurisdiction to interfere with the bargain made between the two companies but it at least has jurisdiction to consider the effect of that bargain when a determination of just and reasonable rates to the consumers of the ultimate product is in issue. If the Board has no such power, then regulation becomes meaningless, and every public utility could, by the exercise of its contract power, defeat the right of the public to a reasonable rate. The Board is directed by Statute to fix just and reasonable rates. The two companies for their inter-pocket purposes may make such bargain as suits themselves but whatever arrangement they do make cannot be permitted to impose upon the customers of one of them for the benefit of the other a cost allocation which on their own evidence is palpably unjust and unreasonable.

On the basis of the inter-company bargain related to the Board's allocation, Madison suffers a loss and Royalite gains an undue advantage. The public cannot be asked to recoup the loss while Royalite retains the advantage.

The schedules as prepared by the Board so far as they relate to cost allocation will, therefore, stand without revision.

WHOLESALE PRICE OF GAS

The wholesale price of gas to be charged by Madison to its various customers is fixed at Nine (9) cents per M.c.f., such price to remain in force until the situation is reviewed, which should be as soon as possible after 1948. This ruling does not preclude a review prior to that date if circumstances and conditions warrant.

The Board's thought is that a period of four years should furnish a measure of experience and knowledge of the workings of the various systems in the field and the results which will flow from the Board's decision, all of which may affect one or other of the various phases dealt with in the decision. By that time, the position of the Ammonia Plant will probably be definitely settled. In other words, the whole position should have become reasonably stabilized by the end of 1948 and a review at that time will be amply warranted, even if it should turn out to be unnecessary.

The price of nine cents per M.c.f. is arrived at in the usual fashion. Madison's rate base and B. A. Utilities' rate base have been projected through the period from 1945 to 1948 by the addition thereto annually of capital additions and a deduction therefrom of depreciation. The rate of return has been applied to the rate bases for each year of the period mentioned; actual operating expenses have been used for the years 1945 and 1946; depreciation has been computed on the basis of operations for these two

years and estimates of operating costs and depreciation have been applied to the years 1947 and 1948. The resultant figures related to actual and estimated sales result in an over-all price of 4.713 cents. To this amount must be added the well-head price of 3 cents per M.c.f., resulting in a figure of 7.713 cents. A price of Nine (9) cents will afford what the Board hopes to be a margin of safety so that a deficit for the period will be avoided and if it should turn out that there is a surplus, it can be dealt with when the time arrives. It will be necessary for the Board to make some adjustment as between Madison and B. A. Utilities but that will be purely an inter-company arrangement in which only the two companies will be concerned.

DATED AT EDMONTON, in the Province of Alberta, this 24th day of March, A. D. 1947.

THE NATURAL GAS UTILITIES BOARD,

"G. M. Blackstock"

CHAIRMAN

MADISON NATURAL GAS CO. LTD.

RATE BASE

As at December 31, 1943

Property, plant and equipment - per Schedule 1 - A		$1,707,455.89
Girbotol prepaid royalty - per evidence W. C. Kirkpatrick in Volume 23 of transcript, pages 1819 et seq.		
Original cost	$ 27,750.00	
Less: Amortization to December 31, 1943 24/83	8,024.00	
	19,726.00	
Add: 9%	1,775.00	21,501.00
Working Capital - per page 67 of text		190,000.00
Total rate base		$1,918,956.89

MADISON NATURAL GAS CO. LTD.

VALUATION OF PROPERTY, PLANT AND EQUIPMENT
FOR RATE BASE PURPOSES

As at December 31, 1943

	Schedule No.	Gross Value	Depreciation Basis	Depreciation Amount	Net Value
Gathering Lines	1-B	$ 646,373.04	Wet Gas Gathered Throughput	$217,342.15	$ 429,030.89
Compression Systems #3 (Field) Compressor	1-C	264,807.08	Wet Gas Gathered Throughput	33,785.47	231,021.61
#1 (Main) Compressor	1-D	351,726.55	Wet Gas Gathered Throughput	82,831.88	268,894.67
Scrubbing Plant	1-E	662,738.66	Scrubbing Throughput	124,000.20	538,738.46
Service Units Steam Plant	1-F	161,208.29	Straight Line to Dec.1963	45,947.50	115,260.79
Electric Plant	1-G	127,957.05	Straight Line to Dec.1963	50,834.63	77,122.42
Water Station	1-H	15,088.45	Straight Line to Dec.1963	3,421.57	11,666.88
Field, Office and General	1-I	4,375.59	(Part Observed (Depreciation (Part 20-Year (Straight (Line Annual	1,156.66	3,218.93
Transportation Equipment	1-J	15,290.52	Observed Depreciation	5,035.80	10,254.72
Fire Equipment	1-K	9,557.05	(Part Observed (Depreciation (Part 20-Year (Straight (Line Annual	1,961.44	7,595.61
Residential Quarters	1-L	16,408.37	Straight Line to Dec.1963	3,663.07	12,745.30
Warehouse	1-M	3,662.70	Straight Line to Dec.1963	1,757.09	1,905.61
		$2,279,193.35		$571,737.46	$1,707,455.89

MADISON NATURAL GAS CO. LTD.

VALUATION OF GATHERING LINES

As at December 31, 1943

	Year of Construction	Gross Value	Depreciation Accrued to Dec. 31/43 Percentage	Depreciation Accrued to Dec. 31/43 Amount
Historical Cost				
	1927	$ 3,565.83	53.06158	$ 1,892.09
	1928	22,264.07	52.75617	11,745.67
	1929	156,221.40	52.35999	81,797.51
	1930	40,135.81	51.85866	20,813.89
	1931	5,628.79	51.29412	2,887.24
	1932	25,091.78	50.69860	12,721.18
	1933	8,733.66	49.42455	4,316.57
	1934	2,087.39	46.80947	977.10
	1935	43,873.49	43.01172	18,870.74
	1936	2,417.88	37.54592	907.82
	1937	44,451.43	30.73078	13,660.27
	1938	33,215.27	24.60681	8,173.22
	1939	5,683.97	20.30296	1,154.01
	1940	11,695.75	17.04031	1,992.99
	1941	29,236.19	13.23400	3,869.12
	1942	2,916.73	8.53097	248.83
	1943	127,545.12	3.03669	3,873.15
		564,764.56	33.624879	189,901.40
General Overhead - 9%		50,828.81	33.624879	17,091.12
		615,593.37	33.624879	206,992.52
Additional 5%		30,779.67	33.624879	10,349.63
Total - to Schedule 1 - A		$646,373.04	33.624879	$217,342.15

NOTE: Depreciation has been computed on the basis of wet gas gathered - per Schedule 1 - O.

MADISON NATURAL GAS CO. LTD.

VALUATION OF NO. 3 (FIELD) COMPRESSOR

As at December 31, 1943

	Year of Construction	Gross Value	Depreciation Accrued to Dec. 31/43 Percentage	Depreciation Accrued to Dec. 31/43 Amount
Historical Cost				
	1927	$ 12,540.63	53.06158	$ 6,654.26
	1928	896.34	52.75617	472.87
	1929	6,450.76	52.35999	3,377.62
	1931	5.23	51.29412	2.68
	1932	1,994.41	50.69860	1,011.14
	1933	5,675.04	49.42455	2,804.86
	1935	18,613.95	43.01172	8,006.18
	1936	837.54	37.54592	314.46
	1937	1,555.35	30.73078	477.97
	1938	1,300.26	24.60681	319.95
	1939	100.00	20.30296	20.30
	1940	680.41	17.04031	115.94
	1941	110.46	13.23400	14.62
	1943	176,063.22	3.03669	5,346.49
		226,823.60	12.758522	28,939.34
Transportation Charges		3,750.00	12.758522	478.44
Construction Equipment Charges		800.00	12.758522	102.07
		231,373.60	12.758522	29,519.85
General Overhead - 9%		20,823.62	12.758522	2,656.79
		252,197.22	12.758522	32,176.64
Additional 5%		12,609.86	12.758522	1,608.83
Total - to Schedule 1 - A		$264,807.08	12.758522	$ 33,785.47

NOTE: Depreciation has been computed on the basis of wet gas gathered - per Schedule 1 - O.

MADISON NATURAL GAS CO. LTD.

VALUATION OF NO. 1 (MAIN) COMPRESSOR

As at December 31, 1943

	Year of Construction	Gross Value	Depreciation Accrued to Dec. 31/43 Percentage	Depreciation Accrued to Dec. 31/43 Amount
Historical Cost				
	1929	$ 1,052.60	52.35999	$ 551.14
	1930	723.94	51.85866	375.43
	1931	6,852.39	51.29412	3,514.87
	1933	386.34	49.42455	190.95
	1934	392.60	46.80947	183.77
	1935	2,176.72	43.01172	936.24
	1936	40.84	37.54592	15.33
	1937	126.00	30.73078	38.72
	1938	232,116.27	24.60681	57,116.41
	1939	2,927.13	20.30296	594.29
	1940	342.39	17.04031	58.34
	1941	50,181.67	13.23400	6,641.04
	1942	135.57	8.53097	11.57
	1943	864.50	3.03669	26.25
		298,318.96	23.550079	70,254.35
Transportation Charges		7,500.00	23.550079	1,766.26
Construction Equipment Charges		1,500.00	23.550079	353.25
		307,318.96	23.550079	72,373.86
General Overhead - 9%		27,658.71	23.550079	6,513.65
		334,977.67	23.550079	78,887.51
Additional 5%		16,748.88	23.550079	3,944.37
Total - to Schedule 1 - A		$351,726.55	23.550079	$ 82,831.88

NOTE: Depreciation has been computed on the basis of wet gas gathered - per Schedule 1 - O.

MADISON NATURAL GAS CO. LTD.

VALUATION OF SCRUBBING PLANT

As at December 31, 1943

Year of Construction	Gross Value	Depreciation Accrued to Dec. 31/43 Percentage	Depreciation Accrued to Dec. 31/43 Amount
Historical Cost			
1926	$118,633.63	29.76060	$ 35,306.08
1927	5,489.11	29.22980	1,604.45
1928	60,244.68	28.54200	17,195.04
1929	29,296.82	27.63842	8,097.18
1930	1,086.98	26.48642	287.90
1931	6,544.04	25.18066	1,647.83
1933	1,990.47	22.36087	445.09
1934	3,503.41	20.90567	732.41
1935	101,384.62	19.37909	19,647.42
1936	54.42	17.67353	9.62
1937	6,786.91	15.82629	1,074.12
1938	17,046.27	13.93247	2,374.97
1939	20,180.06	12.12857	2,447.55
1940	7,436.11	10,31754	767.22
1941	141,224.65	8.21546	11,602.25
1942	17,058.26	5.49840	937.93
1943	9,636.49	1.98381	191.17
	547,596.93	19.05931	104,368.23
Reproduction Cost 1942 (Glycol and M.E.A.)	14,467.00	5.49840	795.45
	562,063.93	18.71027	105,163.68
Transportation Charges	14,000.00	18.71027	2,619.44
Construction Equipment Charges	3,000.00	18.71027	561.31
	579,063.93	18.71027	108,344.43
General Overhead - 9%	52,115.75	18.71027	9,751.00
	631,179.68	18.71027	118,095.43
Additional 5%	31,558.98	18.71027	5,904.77
Total - to Schedule 1 - A	$662,738.66	18.71027	$124,000.20

NOTE: Depreciation has been computed on the basis of dry gas scrubbed - per Schedule 1 - P.

MADISON NATURAL GAS CO. LTD.

VALUATION OF STEAM PLANT

As at December 31, 1943

	Year of Construction	Gross Value	Depreciation Accrued to Dec. 31/43 Percentage (See footnote)	Depreciation Accrued to Dec. 31/43 Amount
Historical Cost				
	1922	$ 4,763.13	51.81	$ 2,467.78
	1926	10,755.28	46.67	5,019.49
	1928	2,524.27	43.66	1,102.10
	1929	8,665.69	42.03	3,642.19
	1930	3,325.70	40.30	1,340.26
	1931	8,694.58	38.46	3,343.94
	1932	3,493.18	36.51	1,275.36
	1933	8,188.10	34.43	2,819.16
	1934	165.84	32.20	53.40
	1935	26,236.82	29.82	7,823.82
	1936	6,844.87	27.27	1,866.60
	1937	21,243.17	24.53	5,210.95
	1938	9,004.35	21.57	1,942.24
	1939	1,934.48	18.37	355.36
	1940	514.68	14.89	76.64
	1942	12,284.00	6.98	857.42
	1943	9,716.63	2.44	237.09
		138,354.77	28.50194	39,433.80
Transportation Charges		2,500.00	28.50194	712.55
		140,854.77	28.50194	40,146.35
General Overhead - 9%		12,676.93	28.50194	3,613.17
		153,531.70	28.50194	43,759.52
Additional 5%		7,676.59	28.50194	2,187.98
Total - to Schedule 1 - A		$161,208.29	28.50194	$45,947.50

NOTE: Depreciation percentages computed on basis of service life from mid-year of installation to Dec. 31, 1963.

MADISON NATURAL GAS CO. LTD.

VALUATION OF ELECTRIC PLANT

As at December 31, 1943

	Year of Construction	Gross Value	Depreciation Accrued to Dec. 31/43 Percentage (See footnote)	Depreciation Accrued to Dec. 31/43 Amount
Historical Cost				
	1923	$ 396.82	50.62	$ 200.87
	1924	3,600.86	49.37	1,777.74
	1927	2,273.23	45.21	1,027.73
	1928	4,928.69	43.66	2,151.87
	1929	54,567.08	42.03	22,934.54
	1930	2,419.30	40.30	974.98
	1931	19,431.30	38.46	7,473.28
	1933	17,217.59	34.43	5,928.02
	1934	377.68	32.20	121.61
	1935	2,846.60	29.82	848.86
	1937	1,294.66	24.53	317.58
	1938	1,185.40	21.57	255.69
	1943	262.50	2.44	6.41
		110,801.71	39.72789	44,019.18
Transportation Charges		1,000.00	39.72789	397.28
		111,801.71	39.72789	44,416.46
General Overhead - 9%		10,062.15	39.72789	3,997.48
		121,863.86	39.72789	48,413.94
Additional 5%		6,093.19	39.72789	2,420.69
Total - to Schedule 1 - A		$127,957.05	39.72789	$50,834.63

NOTE: Depreciation percentages computed on basis of service life from mid-year of installation to Dec. 31, 1963.

Schedule 1 - H

MADISON NATURAL GAS CO. LTD.

VALUATION OF WATER STATION

As at December 31, 1943

	Year of Construction	Gross Value	Depreciation Accrued to Dec. 31/43 Percentage (See footnote)	Depreciation Accrued to Dec. 31/43 Amount
Historical Cost				
	1928	$ 469.59	43.66	$ 205.02
	1929	335.84	42.03	141.15
	1933	1,079.60	34.43	371.71
	1934	577.18	32.20	185.85
	1938	7,441.82	21.57	1,605.20
	1940	3,079.45	14.89	458.53
	1941	198.96	11.11	22.10
	1943	1.00	2.44	.02
		13,183.44	22.67678	2,989.58
General Overhead - 9%		1,186.51	22.67678	269.06
		14,369.95	22.67678	3,258.64
Additional 5%		718.50	22.67678	162.93
Total - to Schedule 1 - A		$ 15,088.45	22.67678	$ 3,421.57

NOTE: Depreciation percentages computed on basis of service life from mid-year of installation to Dec. 31, 1963.

Schedule 1 - I

MADISON NATURAL GAS CO. LTD.

VALUATION OF FIELD OFFICE AND GENERAL EQUIPMENT

As at December 31, 1943

	Gross Value	Depreciation Accrued to Dec. 31/43 Percentage	Depreciation Accrued to Dec. 31/43 Amount (See footnote)
Reproduction Cost			
2 office desks, steel $	150.00		$ 14.00
7 revolving chairs	175.00		18.00
6 arm chairs	108.00		11.00
3 office tables	120.00		24.00
1 filing cabinet	65.00		6.00
2 stenographer's desks	144.00		14.00
2 stenographer's chairs	50.00		5.00
6 oak desks	330.00		66.00
2 typewriters	360.00		36.00
1 calculating machine	710.00		35.00
3 drafting tables	60.00		12.00
1 adding machine	275.00		28.00
1 steel safe	250.00		50.00
1 concrete mixer	500.00		350.00
1 trailer	250.00		100.00
	3,547.00	21.680293	769.00
Historical Cost			
1 office building	276.15	87.499547	241.63
	3,823.15	26.434485	1,010.63
General Overhead - 9%	344.08	26.434485	90.95
	4,167.23	26.434485	1,101.58
Additional 5%	208.36	26.434485	55.08
Total - to Schedule 1 - A $	4,375.59	26.434485	$ 1,156.66

NOTE: Observed depreciation as per Ford, Bacon & Davis appraisal.

Schedule 1 - J

MADISON NATURAL GAS CO. LTD.

VALUATION OF TRANSPORTATION EQUIPMENT

As at December 31, 1943

Year of Acquisition	Gross Value	Depreciation Accrued to Dec. 31/43 Percentage	Depreciation Accrued to Dec. 31/43 Amount
Reproduction Cost			
1 1942 Ford Coupe	$ 1,750.00		$ 437.00
2 1940 Chevrolet Coupes	3,200.00		1,600.00
1 1942 Pontiac Sedan	1,845.00		461.00
1 1942 ½ ton International truck	1,200.00		40.00
1 1942 ½ ton International truck	1,200.00		-
1 1942 ½ ton International truck	1,100.00		330.00
1 1939 2 ton International truck	3,065.00		1,532.00
	13,360.00	32.934132	4,400.00
General Overhead - 9%	1,202.40	32.934132	396.00
	14,562.40	32.934132	4,796.00
Additional 5%	728.12	32.934132	239.80
Total - to Schedule 1 - A	$ 15,290.52	32.934132	$ 5,035.80

MADISON NATURAL GAS CO. LTD.

VALUATION OF FIRE EQUIPMENT

As at December 31, 1943

	Gross Value	Depreciation Accrued to Dec. 31/43 Percentage	Depreciation Accrued to Dec. 31/43 Amount
Reproduction Cost			
1 fire truck	$ 5,000.00		$ 1,000.00
2 hose carts	1,250.00		250.00
19 fire extinguishers	475.00		95.00
1 foamite wagon	560.00		112.00
1 foamite wagon	560.00		112.00
1 duo mixer	400.00		100.00
	8,245.00		1,669.00
Historical Cost			
Sundry equipment	105.41		44.80
	8,350.41	20.523543	1,713.80
General Overhead - 9%	751.54	20.523543	154.24
	9,101.95	20.523543	1,868.04
Additional 5%	455.10	20.523543	93.40
Total - to Schedule 1 - A	$ 9,557.05	20.523543	$ 1,961.44

Schedule 1 - L

MADISON NATURAL GAS CO. LTD.

VALUATION OF RESIDENTIAL QUARTERS

As at December 31, 1943

	Year of Construction	Gross Value	Depreciation Accrued to Dec. 31/43 Percentage (See footnote)	Depreciation Accrued to Dec. 31/43 Amount
Historical Cost				
	1921	$ 325.00	52.94	$ 172.06
	1926	653.71	46.67	305.09
	1930	399.71	40.30	161.08
	1935	3,966.21	29.82	1,182.72
	1937	5,252.31	24.53	1,288.39
	1943	3,739.78	2.44	91.25
		14,336.72	22.324423	3,200.59
General Overhead - 9%		1,290.30	22.324423	288.05
		15,627.02	22.324423	3,488.64
Additional 5%		781.35	22.324423	174.43
Total - to Schedule 1 - A		$ 16,408.37	22.324423	$ 3,663.07

NOTE: Depreciation percentages computed on basis of service life from mid-year of installation to Dec. 31, 1963.

MADISON NATURAL GAS CO. LTD.

VALUATION OF WAREHOUSE

As at December 31, 1943

Year of Construction	Gross Value	Depreciation Accrued to Dec. 31/43 Percentage (See footnote)	Depreciation Accrued to Dec. 31/43 Amount
Historical Cost			
1922	$ 1,876.69	51.81	$ 972.31
1926	559.92	46.67	261.31
1927	226.90	45.21	102.58
1928	220.30	43.66	96.18
1933	43.54	34.43	14.99
1934	272.91	32.20	87.88
	3,200.26	47.97266	1,535.25
General Overhead - 9%	288.03	47.97266	138.17
	3,488.29	47.97266	1,673.42
Additional 5%	174.41	47.97266	83.67
Total - to Schedule 1 - A	$ 3,662.70	47.97266	$ 1,757.09

NOTE: Depreciation percentages computed on basis of service life from mid-year of installation to Dec. 31, 1963.

MADISON NATURAL GAS CO. LTD.

RECONCILIATION OF GROSS VALUE OF FIXED ASSETS FOR RATE BASE PURPOSES AND GROSS BOOK VALUE OF FIXED ASSETS

As at December 31, 1943

Gross Book Value (representing recorded cost to Royalite Oil Co. Ltd.) - per Exhibit 124, Statements W.H. 3 and 10				$1,996,884.27
Add: Land and Rights-of-Ways, not included - per Exhibit 59				4,045.00
				2,000,929.27
Deduct: Installation costs not written off, in respect to gas gathering and other fixed assets since removed (in whole or part) - per Exhibit 124, Statement W.H. 10				69,957.50
Adjusted Historical Cost per Exhibit 124, Statements W.H. 3 and 10				1,930,971.77
Add: Items written off to expense by Royalite Oil Co. Ltd. - at imputed cost			$ 7,573.79	
Less: Recorded value thereof			46.00	
			7,527.79	
Adjustment for allowance of reproduction cost instead of historical cost on following assets	Reproduction	Historical		
Field, office and general	$ 3,547.00	$ 2,598.33		
Transportation	13,360.00	10,941.34		
Fire equipment	8,245.00	7,197.38		
	$25,152.00	$20,737.05	4,414.95	11,942.74
Add: Glycol and M.E.A. - at reproduction cost - Exhibit 59				14,467.00
Transportation charges - Exhibit 59				28,750.00
Construction equipment charges - Exhibit 59				5,300.00
				1,991,431.51
General Overhead - 9%				179,228.83
				2,170,660.34
Additional 5%				108,533.01
Gross value of property, plant and equipment for rate base purposes - per Schedule 1 - A				$2,279,193.35

ROYALITE OIL CO. LTD. AND MALISON NATURAL G.S CO. LTD.

DEPRECIATION TABLE ON BASIS OF WET GAS GATHERED

	Reserve Remaining at Jan. 1 m.c.f.	Annual Throughput m.c.f.	Reserve Remaining at DEC. 31 m.c.f.	½ Annual Throughput m.c.f.	Reserve Remaining at Midyear m.c.f.	Throughput from Mid-year to Dec.31/43 m.c.f.	Percentage Depreciation Accrued by Dec. 31/43 m.c.f.
1926	-	-	747,035,079		747,035,079	397,430,079	53.200993
1927	747,035,079	4,437,430	742,597,649	2,218,715	744,816,364	395,211,364	53.061585
1928	742,597,649	5,192,523	737,405,126	2,596,262	740,001,388	390,396,388	52.756170
1929	737,405,126	7,115,451	730,289,675	3,557,726	733,847,401	384,242,401	52.359987
1930	730,289,675	8,168,491	722,121,184	4,084,246	726,205,430	376,600,430	51.858663
1931	722,121,184	8,666,159	713,455,025	4,333,080	717,788,105	368,183,105	51.294121
1932	713,455,025	8,674,379	704,780,646	4,337,190	709,117,836	359,512,836	50.698603
1933	704,780,646	27,052,588	677,728,058	13,526,294	691,254,352	341,649,352	49.424550
1934	677,728,058	40,917,500	636,810,558	20,458,750	657,269,308	307,664,308	46.809474
1935	636,810,558	46,684,650	590,125,908	23,342,325	613,468,233	263,863,233	43.011719
1936	590,125,908	60,693,290	529,432,618	30,346,645	559,779,263	210,174,263	37.545918
1937	529,432,618	49,455,810	479,976,808	24,727,905	504,704,713	155,099,713	30.730784
1938	479,976,808	32,535,610	447,441,198	16,267,805	463,709,003	114,104,003	24.606812
1939	447,441,198	17,547,477	429,893,721	8,773,739	438,667,460	89,062,460	20.302956
1940	429,893,721	16,956,433	412,937,288	8,478,217	421,415,505	71,810,505	17.040309
1941	412,937,288	20,017,433	392,919,855	10,008,717	402,928,572	53,323,572	13.234001
1942	392,919,855	21,417,068	371,502,787	10,708,534	382,211,321	32,606,321	8.530967
1943	371,502,787	21,897,787	349,605,000	10,948,894	360,553,894	10,948,894	3.036687
1944	349,605,000						
Effective production to December 31, 1943		397,430,079					
Estimated reserve December 31, 1943		349,605,000					
		747,035,079					

NOTE: Percentages of depreciation given in final column are applicable to assets contained in Schedules 1 - B, 1 - C, and 1 - D. See page 67 of text.

ROYALITE OIL CO. LTD. AND MADISON NATURAL GAS CO. LTD.

DEPRECIATION TABLE ON BASIS OF DRY GAS SCRUBBED

Year	Reserve Remaining at Jan. 1 m.c.f.	Annual Throughput m.c.f.	Reserve Remaining at Dec.31 m.c.f.	½ Annual Throughput m.c.f.	Reserve Remaining at Midyear m.c.f.	Throughput from Mid-year to Dec. 31/43 m.c.f.	Percentage Depreciation Accrued by Dec. 31/43 of Assets Acquired m.c.f.
1925	-	-	512,088,680	-	512,088,680	153,530,680	29.981268
1926	512,088,680	3,217,657	508,871,023	1,608,829	510,479,852	151,921,852	29.760597
1927	508,871,023	4,439,796	504,431,227	2,219,898	506,651,125	148,093,125	29.229802
1928	504,431,227	5,313,523	499,117,704	2,656,762	501,774,466	143,216,466	28.541999
1929	499,117,704	7,217,742	491,899,962	3,608,871	495,508,833	136,950,833	27.638424
1930	491,899,962	8,312,099	483,587,863	4,156,050	487,743,913	129,185,913	26.486423
1931	483,587,863	8,712,269	474,875,594	4,356,135	479,231,729	120,673,729	25.180663
1932	474,875,594	8,692,329	466,183,265	4,346,165	470,529,430	111,971,430	23.796903
1933	466,183,265	8,713,763	457,469,502	4,356,882	461,826,384	103,268,384	22.360867
1934	457,469,502	8,279,802	449,189,700	4,139,901	453,329,601	94,771,601	20.905672
1935	449,189,700	8,888,030	440,301,670	4,444,015	444,745,685	86,187,685	19.379094
1936	440,301,670	9,539,599	430,762,071	4,769,800	435,531,871	76,973,871	17.673534
1937	430,762,071	9,576,437	421,185,634	4,788,219	425,973,853	67,415,853	15.826289
1938	421,185,634	9,169,704	412,015,930	4,584,852	416,600,782	58,042,782	13.932471
1939	412,015,930	7,934,923	404,080,991	3,967,470	408,048,461	49,490,461	12.128574
1940	404,080,991	8,545,203	395,535,788	4,272,602	399,808,390	41,250,390	10.317540
1941	395,535,788	9,767,859	385,767,929	4,883.930	390,651,859	32,093,859	8.215463
1942	385,767,929	12,695,778	373,072,151	6,347,889	379,420,040	20,862,040	5.498402
1943	373,072,151	14,514,151	358,558,000	7,257,076	365,815,076	7,257,076	1.983810
1944	358,558,000						

Effective production to December 31,1943	153,530,680
Estimated reserve December 31,1943	358,558,000
Total Effective Throughput	512,088,680

NOTE: Percentages of depreciation given in final column are applicable to assets contained in Schedule 1 - E. See page 67 of text.

Schedule 2

BRITISH AMERICAN GAS UTILITIES LIMITED

RATE BASE

As at December 31, 1944

Property, Plant and Equipment			
Assets taken over from British American Oil Co. Ltd.			
Old High Pressure Gathering Lines	2-A	$ 88,565.62	
Water System	2-B	11,988.95	$100,554.57
Assets constructed under Board Order			
Low Pressure Gathering Lines	2-C	106,864.00	
Low Pressure Compression Station	2-C	136,344.00	
Transmission Line	2-C	199,566.00	
High Pressure Compression Station	2-C	171,061.00	
Repressure Line	2-C	31,799.00	645,634.00
Incidental items			
Automotive equipment - at cost per Ex. 102D			4,042.00
Office equipment - at cost per Ex. 102D			747.00
Total property, plant and equipment			750,977.57
Working Capital			20,000.00
Total rate base			$770,977.57

See page 86 of text.

BRITISH AMERICAN GAS UTILITIES LIMITED

VALUATION OF OLD HIGH PRESSURE GATHERING LINES

As at December 31, 1944

Year of Construction	Gross Value	Depreciation Accrued to Dec. 31/44 Percentage (See footnote)	Depreciation Accrued to Dec. 31/44 Amount	Net Value Dec.31/44
Historical Cost				
1936	$ 28,827.71	45.94594	$ 13,245.16	
1937	15,062.93	42.85714	6,455.54	
1938	13,471.07	39.39394	5,306.79	
1941	26,999.61	25.92592	6,999.90	
1942	15,999.69	20.0	3,199.94	
1943	14,869.69	13.04348	1,939.52	
1944	2,551.87	4.76190	121.52	
	117,782.57	31.64167	37,268.37	
General Overhead - 10%	11,778.26	31.64167	3,726.84	
	$129,560.83	31.64167	$ 40,995.21	$ 88,565.62

NOTE: Depreciation percentage for each year's additions arrived at as follows:

$$\frac{\text{Number of years from mid-year of installation to Dec. 31, 1944}}{\text{Number of years from mid-year of installation to Dec. 31, 1954}} \times 100$$

BRITISH AMERICAN GAS UTILITIES LIMITED

VALUATION OF WATER SYSTEM

As at December 31, 1944

Year of Construction	Gross Value	Depreciation Accrued to Dec. 31/44 Percentage (See footnote)	Depreciation Accrued to Dec. 31/44 Amount	Net Value Dec.31/44
Historical Cost				
1936	$ 4,857.28	45.94594	$ 2,231.72	
1937	12,195.20	42.85714	5,226.51	
1944	1,370.03	4.76190	65.23	
	18,422.51	40.83841	7,523.46	
General Overhead - 10%	1,842.25	40.83841	752.35	
	$ 20,264.76	40.83841	$ 8,275.81	$ 11,988.95

NOTE: Depreciation percentage for each year's additions arrived at as follows:

$$\frac{\text{Number of years from mid-year of installation to Dec. 31, 1944}}{\text{Number of years from mid-year of installation to Dec. 31, 1954}} \times 100$$

BRITISH AMERICAN GAS UTILITIES LIMITED

VALUATION OF PROPERTY, PLANT AND EQUIPMENT INSTALLED UNDER BOARD ORDER

As at December 31, 1944

	Original Estimate and Board Order #1 (Note 1)	Additional Amounts Authorized (Note 1)	Additional Costs Occasioned by Gentry Contract (Note 2)	Total	Overhead 10%	Total
Low Pressure Gathering Lines	$ 67,608.00	$ 5,204.00	$ 24,337.00	$ 97,149.00	$ 9,715.00	$106,864.00
Low Pressure Compression Station	84,268.00	39,681.00	-	123,949.00	12,395.00	136,344.00
High Pressure Transmission Line	149,810.00	-	31,614.00	181,424.00	18,142.00	199,566.00
High Pressure Compression Station	155,510.00	-	-	155,510.00	15,551.00	171,061.00
Repressure Lines	23,485.00	-	5,423.00	28,908.00	2,891.00	31,799.00
	$480,681.00	$44,885.00	$ 61,374.00	$586,940.00	$58,694.00	$645,634.00

NOTE 1: Per page 86 of text.

NOTE 2: Additional costs occasioned by Gentry contract have been adopted from Exhibit 102D, the amounts stated herein are before overhead and interest, (see pages 85 and 86 of text).

MADISON NATURAL GAS CO. LTD.

APPROXIMATE OPERATING COSTS

1945 - 1948

	Direct Operating	Administrative and General	Direct Depreciation	Return on Investment	Total	Distribution of Compression	Total Functional Costs
1945							
Scrubbing	$ 203,584	$ 25,529	$ 26,672	$ 69,800	$ 325,585	$	$ 325,585
Compressor #1	92,171	12,799	21,378	46,190	172,538	Cr.172,538	-
Compressor #3	76,204	11,042	16,348	35,980	139,574	Cr.139,574	-
Gathering	72,258	10,318	28,784	60,815	172,175	248,727	420,902
Residue Transmission	13,753	352	6,844	7,693	28,642	39,597	68,239
Repressuring	2,861	415	893	1,650	5,819	23,788	29,607
Total	460,831	60,455	100,919	222,128	844,333	-	844,333
1946							
Scrubbing	165,593	16,767	26,132	67,223	275,715	-	275,715
Compressor #1	73,406	7,980	23,050	47,713	152,149	Cr.152,149	-
Compressor #3	62,831	7,405	16,792	35,483	122,511	Cr.122,511	-
Gathering	64,157	7,561	29,568	59,988	161,274	196,827	358,101
Residue Transmission	14,124	251	8,883	8,923	32,181	36,753	68,934
Repressuring	2,728	321	1,744	2,893	7,686	41,080	48,766
Total	382,839	40,285	106,169	222,223	751,516	-	751,516
1947							
Scrubbing	152,387	16,046	27,216	64,157	259,806	-	259,806
Compressor #1	72,156	8,103	27,618	49,193	157,070	Cr.157,070	-
Compressor #3	62,749	7,684	18,251	33,570	122,254	Cr.122,254	-
Gathering	64,654	7,916	32,821	57,682	163,073	198,668	361,741
Residue Transmission	14,133	261	8,883	7,891	31,168	36,676	67,844
Repressuring	2,747	336	2,029	3,986	9,698	43,980	53,678
Rate hearing	-	68,070	-	13,837	81,907	-	81,907
Total	368,826	108,416	117,418	230,316	824,976	-	824,976

MADISON NATURAL GAS CO. LTD.

APPROXIMATE OPERATING COSTS - CONTINUED

1945 - 1948

	Direct Operating	Administrative and General	Direct Depreciation	Return on Investment	Total	Distribution of Compression	Total Functional Costs
1948							
Scrubbing	$ 157,410	$ 16,661	$ 27,204	$ 60,762	$ 262,037	$ -	$ 262,037
Compressor #1	74,832	8,251	28,578	49,487	161,148	Cr. 161,148	-
Compressor #3	62,619	7,510	17,491	31,411	119,031	Cr. 119,031	-
Gathering	64,647	7,754	32,157	54,988	159,546	199,349	358,895
Residue Transmission	14,133	256	8,883	6,853	30,125	35,709	65,834
Repressuring	2,746	329	2,629	3,677	9,381	45,121	54,502
Rate hearing	-	68,070	-	4,612	72,682	-	72,682
Total	376,387	108,831	116,942	211,790	813,950	-	813,950
Total 4 years	$1,588,883	$ 317,987	$ 441,448	$ 886,457	$3,234,775	$ -	$3,234,775

MADISON NATURAL GAS CO. LTD.

ALLOCATION OF APPROXIMATE OPERATING COSTS

1945 - 1948

	Total Functional Costs	To Residue Market	To Absorption Plant	To Producers
1945				
Scrubbing	$ 325,585	$ 325,585	$	$
Gathering	420,902	252,541	168,361	
Residue Transmission	68,239	66,039		2,200
Repressuring	29,607	29,607		
Total	844,333	673,772	168,361	2,200
1946				
Scrubbing	275,715	275,715		
Gathering	358,101	214,861	143,240	
Residue Transmission	68,934	66,287		2,647
Repressuring	48,766	48,766		
Total	751,516	605,629	143,240	2,647
1947				
Scrubbing	259,806	259,806		
Gathering	361,741	217,045	144,696	
Residue Transmission	67,844	65,241		2,603
Repressuring	53,678	53,678		
Rate hearing	81,907	81,907		
Total	824,976	677,677	144,696	2,603
1948				
Scrubbing	262,037	262,037		
Gathering	358,895	215,337	143,558	
Residue Transmission	65,834	63,231		2,603
Repressuring	54,502	54,502		
Rate hearing	72,682	72,682		
Total	813,950	667,789	143,558	2,603
Total 4 years	$3,234,775	$2,624,867	$ 599,855	$ 10,053

BRITISH AMERICAN GAS UTILITIES LIMITED

APPROXIMATE OPERATING COSTS

1945 - 1948

	Direct Operating	Administrative	Depreciation	Return on Investment	Credit for Residue Transmission	Distribution of Water Station Costs	Distribution of Fuel Scrubbing Costs	Total Functional Costs
1945								
Gathering Lines	$ 7,896	$ 2,127	$ 19,543	$ 21,966	$ -	$ -	$ -	$ 51,532
Low Pressure Compression Station	22,678	3,876	13,634	15,989	-	656	1,405	58,238
High Pressure Compression Station	26,534	4,553	17,106	19,987	-	870	1,873	70,923
Repressure Line	3,651	764	3,180	3,665	-	-	-	11,260
Transmission Line	6,513	2,924	19,956	22,371	Cr. 11,333	-	-	40,431
Fuel Scrubbing	2,745	429	-	104	-	-	Cr. 3,278	-
Water Station	3,127	327	1,199	1,451	-	Cr. 6,104	-	-
Total	73,144	15,000	74,618	85,533	Cr. 11,333	Cr. 4,578	-	232,384
1946								
Gathering Lines	7,896	2,127	19,543	19,673	-	-	-	49,239
Low Pressure Compression Station	22,678	3,876	13,634	14,361	-	641	1,403	56,593
High Pressure Compression Station	26,534	4,553	17,106	17,947	-	849	1,871	68.860
Repressure Line	3,651	764	3,180	3,288	-	-	-	10,883
Transmission Line	6,513	2,924	19,956	20,031	Cr. 12,000	-	-	37,424
Fuel Scrubbing	2,745	429	-	100	-	-	Cr. 3,274	-
Water Station	3,127	327	1,199	1,305	-	Cr. 5,958	-	-
Total	73,144	15,000	74,618	76,705	Cr. 12,000	Cr. 4,468	-	222,999

BRITISH AMERICAN GAS UTILITIES LIMITED

APPROXIMATE OPERATING COSTS - CONTINUED

1945 - 1948

	Direct Operating	Administrative	Depreciation	Return on Investment	Credit for Residue Transmission	Distribution of Water of Station Costs	Distribution Fuel Scrubbing Costs	Total Functional Costs
1947								
Gathering Lines	$ 7,896	$ 2,127	$ 19,543	$ 17,379	$ -	$ - -	$	$ 46,945
Low Pressure Compression Station	22,678	3,876	13,635	12,732	-	625	1,401	54,947
High Pressure Compression Station	26,534	4,553	17,106	15,904	-	828	1,868	66,793
Repressure Line	3,651	764	3,180	2,911	-	-	-	10,506
Transmission Line	6,513	2,924	19,957	17,692	Cr.12,000	-	-	35,086
Fuel Scrubbing	2,745	429	-	95	-	-	Cr. 3,269	-
Water Station	3,127	327	1,199	1,160	-	Cr. 5,813	-	-
Rate hearing	-	8,332	-	1,383	-	-	-	9,715
Total	73,144	23,332	74,620	69,256	Cr.12,000	Cr. 4,360	-	223,992
1948								
Gathering Lines	7,896	2,127	19,543	15,086	-	-	-	44,652
Low Pressure Compression Station	22,678	3,876	13,635	11,102	-	-609	1,399	53,299
High Pressure Compression Station	26,534	4,553	17,106	13,866	-	808	1,866	64,733
Repressure Line	3,651	764	3,180	2,534	-	-	-	10,129
Transmission Line	6,513	2,924	19,957	15,353	Cr.12,000	-	-	32,747
Fuel Scrubbing	2,745	429	-	91	-	-	Cr. 3,265	-
Water Station	3,127	327	1,199	1,015	-	Cr. 5,668	-	-
Rate hearing	-	8,332	-	461	-	-	-	8,793
Total	73,144	23,332	74,620	59,508	Cr. 12,000	Cr. 4,251	-	214,353
Total 4 years	$292,576	$ 76,664	$ 298,476	$291,002	Cr.$47,333	Cr.$17,657	$ -	$893,728

BRITISH AMERICAN GAS UTILITIES LIMITED

ALLOCATION OF APPROXIMATE OPERATING COSTS

1945 - 1948

	Total Functional Costs	To Residue Market	To Absorption Plant	To Producers
1945				
Gathering Lines	$ 51,532	$ 20,613	$ 30,919	$
Low Pressure Compression Station	58,238	11,648	34,942	11,648
High Pressure Compression Station	70,923	56,738		14,185
Repressure Line	11,260	9,008		2,252
Transmission Line	40,431	40,431		
Total	232,384	138,438	65,861	28,085
1946				
Gathering Lines	49,239	19,696	29,543	
Low Pressure Compression Station	56,593	11,319	33,955	11,319
High Pressure Compression Station	68,860	55,088		13,772
Repressure Line	10,883	8,706		2,177
Transmission Line	37,424	37,424		
Total	222,999	132,233	63,498	27,268
1947				
Gathering Lines	46,945	18,778	28,167	
Low Pressure Compression Station	54,947	10,989	32,969	10,989
High Pressure Compression Station	66,793	53,434		13,359
Repressure Line	10,506	8,405		2,101
Transmission Line	35,086	35,086		
Rate hearing	9,715	9,715		
Total	223,992	136,407	61,136	26,449
1948				
Gathering Lines	44,652	17,861	26,791	
Low Pressure Compression Station	53,299	10,660	31,979	10,660
High Pressure Compression Station	64,733	51,786		12,947
Repressure Line	10,129	8,103		2,026
Transmission Line	32,747	32,747		
Rate Hearing	8,793	8,793		
	214,353	129,950	58,770	25,633
Total 4 years	$ 893,728	$ 537,028	$ 249,265	$ 107,435

Schedule 5

MADISON NATURAL GAS CO. LTD.
BRITISH AMERICAN GAS UTILITIES LIMITED

ESTIMATED UNIT COSTS PER M.C.F. TO RESIDUE MARKET

1945 to 1948

	Total	1945	1946	1947	1948
Market deliveries in billions c.f.					
For current sale	64.392	16.509	15.591	16.150	16.142
Free to Town of Bow Island	.104	.054	.050	-	-
For storage at Bow Island	3.396	.745	.939	.856	.856
Total	67.892	17.308	16.580	17.006	16.998
Add: Metering difference	.046	.046	-	-	-
	67.938	17.354	16.580	17.006	16.998
Deduct: Non-rateable gas					
Town of Bow Island	.104	.054	.050	-	-
Bow Island storage	.745	.745	-	-	-
Net rateable total	67.089	16.555	16.530	17.006	16.998
Source thereof by areas					
B. A.	12.288	3.131	2.879	3.140	3.138
G. O. R.	4.021	.880	1.059	1.041	1.041
Madison	50.780	12.544	12.592	12.825	12.819
Total	67.089	16.555	16.530	17.006	16.998
Utility Costs to be borne by residue market, incurred by					
B.A. Gas Utilities Ltd.	$ 537,028	$138,438	$132,233	$136,407	$129,950
G.O. Refineries Ltd.	-	-	-	-	-
Madison Natural Gas Co. Ltd.	2,624,867	673,772	605,629	677,677	667,789
Total	$3,161,895	$812,210	$737,862	$814,084	$797,739
Unit cost per rateable m.c.f. (Note)					
Utility Service	4.713¢	4.906¢	4.464¢	4.787¢	4.693¢
Well head price	3.000	3.000	3.000	3.000	3.000
Total	7.713¢	7.906¢	7.464¢	7.787¢	7.693¢

NOTE: Includes Bow Island storage for 1946, 1947, 1948.